Mind of Leonardo | Fake News | Crater Discovery | Not Knowing | Science of Yoga | Replication Crisis

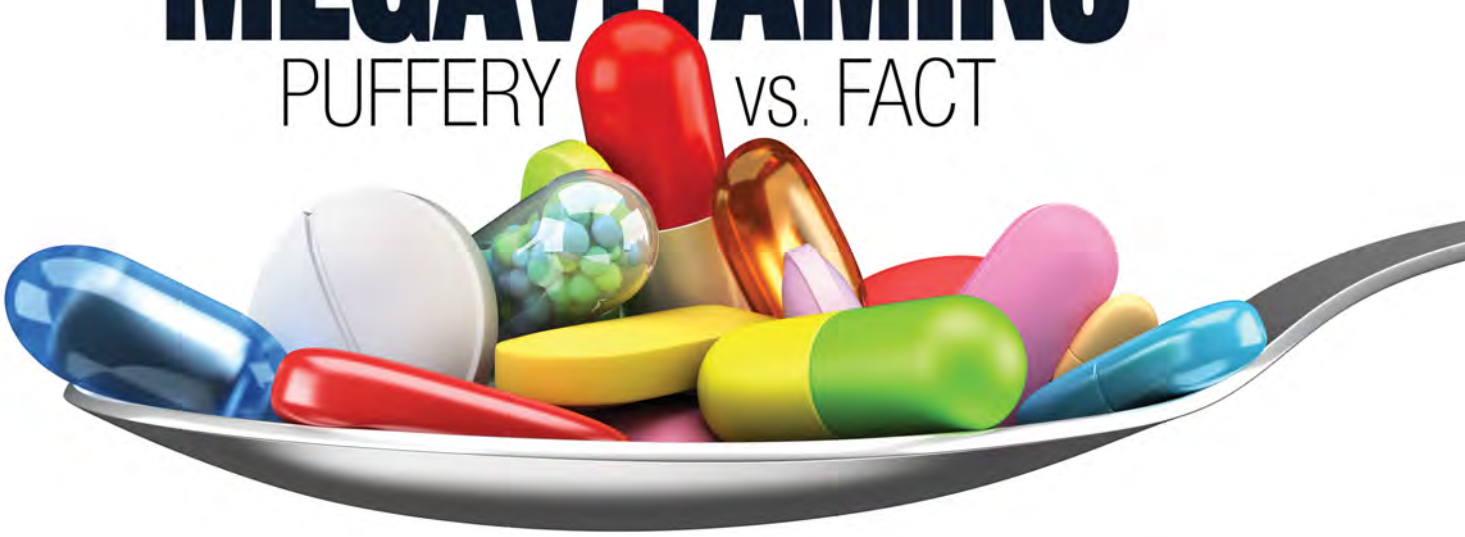
Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 43 No. 2 | March/April 2019

MEGAVITAMINS

PUFFERY vs. FACT



Respectful Skepticism

Assault on Materialism

What We Skeptics Do

REVIEWS:

Skeptics' Guide to the Universe

At Least Know This

Transcendental Deception

INTRODUCTORY PRICE U.S. and Canada $5.99

0 09281 02614 3 04

CSICON 2018 SPECIAL SECTION

CSI
Committee for Skeptical Inquiry

Committee for Skeptical Inquiry www.csicop.org

Robyn E. Blumner, President and CEO
Barry Karr, Executive Director

Joe Nickell, Senior Research Fellow
Massimo Polidoro, Research Fellow

Benjamin Radford, Research Fellow
Richard Wiseman, Research Fellow

Fellows

James E. Alcock,* psychologist, York Univ., Toronto

Marcia Angell, MD, former editor-in-chief, *New England Journal of Medicine*

Kimball Atwood IV, MD, physician; author; Newton, MA

Banachek, professional magician/mentalist, magic consultant/producer

Stephen Barrett, MD, psychiatrist; author; consumer advocate, Pittsboro, NC

Robert Bartholomew, sociologist, investigative journalist, Auckland, New Zealand

Willem Betz, MD, professor of medicine, Univ. of Brussels

Irving Biederman, psychologist, Univ. of Southern California

Susan Blackmore, visiting lecturer, Univ. of the West of England, Bristol

Sandra Blakeslee, science writer; author; *New York Times* science correspondent

Mark Boslough, physicist, Albuquerque, NM

Henri Broch, physicist, Univ. of Nice, France

Jan Harold Brunvand, folklorist; professor emeritus of English, Univ. of Utah

Mario Bunge, philosopher, McGill Univ., Montreal

Sean B. Carroll, molecular geneticist; vice president for science education, Howard Hughes Medical Institute, Madison, WI

Thomas R. Casten, energy expert, Hinsdale, IL

John R. Cole, anthropologist; editor, National Center for Science Education

K.C. Cole, science writer; author; professor, Univ. of Southern California's Annenberg School of Journalism

John Cook, Center for Climate Change Communication, George Mason University, Virginia.

Frederick Crews, literary and cultural critic; professor emeritus of English, Univ. of CA, Berkeley

Richard Dawkins, zoologist, Oxford Univ.

Geoffrey Dean, technical editor, Perth, Australia

Cornelis de Jager, professor of astrophysics, Univ. of Utrecht, the Netherlands

Daniel C. Dennett, Austin B. Fletcher Professor of Philosophy and director of Center for Cognitive Studies, Tufts Univ.

Ann Druyan, writer and producer; CEO, Cosmos Studios

Sanal Edamaruku, president, Indian Rationalist Association and Rationalist International

Edzard Ernst, former professor of complementary medicine, University of Exeter

Kenneth Feder, professor of anthropology, Central Connecticut State Univ.

Krista Federspiel, science journalist, expert on complementary and alternative medicine, Vienna, Austria.

Kevin Folta, molecular biologist, professor and chair of Horticultural Sciences Department, University of Florida.

Barbara Forrest, professor of philosophy, SE Louisiana Univ.

Andrew Fraknoi, astronomer, University of San Francisco

Kendrick Frazier,* science writer; editor,Skeptical Inquirer

Christopher C. French, professor, Department of Psychology, and head of the Anomalistic Psychology Research Unit, Goldsmiths College, Univ. of London

Julia Galef, host of the Rationally Speaking podcast; cofounder, Center for Applied Rationality, Berkeley, CA

Luigi Garlaschelli, chemist, Università di Pavia (Italy); research fellow of CICAP, the Italian skeptics group

Maryanne Garry, professor, School of Psychology, Victoria Univ. of Wellington, New Zealand

Murray Gell-Mann, professor of physics, Santa Fe Institute; Nobel laureate

Susan Gerbic, founder and leader of Guerilla Skepticism on Wikipedia (GSoW) project

Thomas Gilovich, psychologist, Cornell Univ.

David H. Gorski, cancer surgeon and researcher at Barbara Ann Karmanos Cancer Institute and chief of breast surgery section, Wayne State University School of Medicine.

Wendy M. Grossman, writer; founder and first editor, *The Skeptic magazine* (UK)

Susan Haack, Cooper Senior Scholar in Arts and Sciences, professor of philosophy, University of Miami

Harriet Hall,* MD, physician; investigator, Puyallup, WA

David J. Helfand, professor of astronomy, Columbia Univ.

Terence M. Hines, prof. of psychology, Pace Univ., Pleasantville, NY

Douglas R. Hofstadter, professor of human understanding and cognitive science, Indi-ana Univ.

Gerald Holton, Mallinckrodt Professor of Physics and professor of history of science, emeritus, Harvard University.

Deborah Hyde, skeptic, folklorist, cultural anthropologist, Editor in Chief, *The Skeptic* (U.K.)

Ray Hyman,* psychologist, Univ. of Oregon

Stuart D. Jordan, NASA astrophysicist emeritus

Barry Karr, executive director, Committee for Skeptical Inquiry, Amherst, NY

Edwin C. Krupp, astronomer; director, Griffith Observatory, Los Angeles, CA

Lawrence Kusche, science writer

Stephan Lewandowsky, psychologist, School of Experimental Psychology and Cabot Institute, Univ. of Bristol, UK

Scott O. Lilienfeld,* psychologist, EmoryUniv., Atlanta, GA

Lin Zixin, former editor, *Science and Technol-o gy Daily* (China)

Jere Lipps, Museum of Paleontology, Univ. of California,Berke ley

Elizabeth Loftus,* professor of psychology, Univ. of California, Irvine

Daniel Loxton, author, editor of *Junior Skeptic* at *Skeptic* magazine (US), artist, Vancouver, B.C., Canada

Michael E. Mann, Distinguished Professor of Atmospheric Sciences and director of the Earth Systems Sciences Center, Pennsylvania State University

David Marks, psychologist, City Univ., London

Mario Mendez-Acosta, journalist and science writer, Mexico City

Kenneth R. Miller, professor of biology, Brown Univ.

David Morrison, space scientist, NASA Ames Research Center

Richard A. Muller, professor of physics, Univ. of California, Berkeley

Joe Nickell, senior research fellow, CSI

Jan Willem Nienhuys, mathematician, Waalre, The Netherlands

Lee Nisbet, philosopher, Medaille College

Steven Novella,* MD, assistant professor of neurology, Yale Univ. School of Medicine

Bill Nye, science educator and television host, Nye Labs

James E. Oberg, science writer

Paul Offit, professor of pediatrics, director of the Vaccine Education Center, the Children's Hospital of Philadelphia

Naomi Oreskes, geologist and professor, departments of the History of Science and Earth and Planetary Sciences, Harvard Univ., Cambridge, MA

Loren Pankratz, psychologist, Oregon Health Sciences Univ.

Robert L. Park, emeritus professor of physics, U of Maryland

Jay M. Pasachoff, professor of astronomy and director of Hopkins Observatory, Williams College

John Paulos, mathematician, Temple Univ.

Clifford A. Pickover, scientist, author, editor, IBM T.J. Watson Research Center.

Massimo Pigliucci, professor of philosophy, City Univ. of New York–Lehman College

Steven Pinker, cognitive scientist, HarvardUniv.

Massimo Polidoro, science writer; author; executive director of CICAP, Italy

James L. Powell, geochemist, author, executive director, National Physical Science Consortium

Anthony R. Pratkanis, professor of psychology, Univ. of CA, Santa Cruz

Donald R. Prothero, paleontologist/geologist, Natural History Museum of Los Angeles County, Los Angeles, CA

Benjamin Radford, investigator; research fellow, Committee for Skeptical Inquiry

James "The Amazing" Randi, magician; CSICOP founding member; founder, James Randi Educational Foundation

Milton Rosenberg, psychologist, Univ. of Chicago

Amardeo Sarma,* chairman, GWUP, Germany

Richard Saunders, Life Member, Australian Skeptics; educator; investigator; podcaster; Sydney, Australia

Joe Schwarcz, director, McGill Office for Science and Society

Eugenie C. Scott,* physical anthropologist; chair, advisory council , National Center for Science Education

Seth Shostak, senior astronomer, SETI Institute, Mountain View, CA

Simon Singh, science writer; broadcaster; UK

Dick Smith, entrepreneur, publisher, aviator, adventurer, Terrey Hills, N.S.W., Australia

Keith E. Stanovich, cognitive psychologist, professor of applied psychology, Univ. of Toronto

Karen Stollznow,* linguist; skeptical investigator; writer; podcaster

Jill Cornell Tarter, astronomer, SETI Institute, Mountain View, CA

Carol Tavris, psychologist and author, Los Angeles, CA

David E. Thomas,* physicist and mathematician, Socorro, NM

Neil deGrasse Tyson, astrophysicist and director, Hayden Planetarium, New York City

Indre Viskontas, cognitive neuroscientist, TV and podcast host, and opera singer, San Francisco, California

Stuart Vyse, psychologist, former Joanne Toor Cummings '50 professor of psychology, Connecticut College

Marilyn vos Savant, *Parade* magazine contributing editor

Steven Weinberg, professor of physics and astronomy, Univ. of Texas at Austin; Nobel laureate

E.O. Wilson, Univ. professor emeritus, organismic and evolutionary biology, Harvard Univ.

Richard Wiseman, psychologist, Univ. of Hertfordshire, England

Benjamin Wolozin, professor, Department of Pharmacology, Boston Univ. School of Medicine

*Member, CSI Executive Council (Affiliations given for identification only.)

The Skeptical Inquirer (ISSN 0194-6730) is published bi-monthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at addition al mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

Inquiries from the media and the public about the work of the Committee should be made to Barry Karr, Executive Director, CSI, P.O. Box 703, Amherst, NY 14226-0703. Tel.:716-636-1425. Fax: 716-636-1733. Email: bkarr@centerforinquiry.org

Manuscripts, letters, books for review, and editorial inquiries should be sent to Kendrick Frazier, Editor, Skeptical Inquirer, EMAIL: kendrickfrazier@comcast.net. Mail: 944 Deer Drive NE, Albuquerque, NM 87122. Please consult our Guide for Authors for style, reference, and submittal instructions. It is on our website at www.csicop.org/publications/guide.

Articles, reports, reviews, and letters published in the SKEPTICAL INQUIRER represent the views and work of individual authors. Their publication does not necessarily constitute an endorsement by CSI or its members unless so stated.

Copyright ©2019 by the Center for Inquiry and the Committee for Skeptical Inquiry. All rights reserved.

Subscriptions and changes of address should be addressed to: SKEPTICAL INQUIRER, P.O. Box 703, Amherst, NY 14226-0703 or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new are necessary for change of address, with ten weeks advance notice. Skeptical Inquirer subscribers may not speak on behalf of CSI or the Skeptical Inquirer.

Postmaster: Send changes of address to Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703.

cfi A PROGRAM OF CENTER FOR INQUIRY

Skeptical Inquirer March/April 2019 | Vol. 43, No. 2

FEATURES

46

Antioxidant Megavitamins for Brain Health: Puffery vs. Fact

Billions of dollars are spent on worthless and even harmful megavitamin therapy, especially with vitamins C and E. How did the craze for megavitamins and multivitamins come about, and why does it continue?

REYNOLD SPECTOR

51

Respectful Skepticism

Being respectful isn't just a nice thing to do. Skeptics are more likely to succeed if they defend science and reason in a consistently respectful manner.

CRAIG A. FOSTER

56

The Dematerialization Crusade

What have spiritualism and dematerialization added to the body of certified knowledge? Although many proponents of dematerialism have been distinguished scientists, they earned their stripes by inventing theories or methods that had little or nothing to do with that.

MARIO BUNGE

CONFERENCE REPORT

12

Superstars, Timely Insights, Fun: Latest CSICon Was Biggest (and Best?) Ever

KENDRICK FRAZIER

OUT-OF-THE-BOX SKEPTICISM: OPENING CSICON 2018 ..... **14**

PARASITES AND MODERN MIND CONTROL **15**

FALSE BELIEFS HANDLED WITH CARE AT CSICON 2018 ..... **15**

IMPROVING THE NARRATIVE: ENLIGHTENMENT AND ILLUSIONS **17**

IT HAS ALWAYS BEEN A MATTER OF TRUST **19**

PLAYING GRACEFULLY WITH IDEAS: STEPHEN FRY, EVOLUTION, AND LEONARDO **20**

PAUL FIDALGO
PHOTOS BY BRIAN ENGLER

COMMENTARIES

22

You Can't Fit What We Skeptics Do into a Neat Box

KENDRICK FRAZIER

24

Embracing Option D: Knowing When You Don't Know

BENJAMIN RADFORD

A Look into the Transcendental Deception

JOSEPH SZIMHART **61**

Transcendental Deception: Behind the TM Curtain—Bogus Science, Hidden Agendas, and David Lynch's Campaign to Push a Million Public School Kids into Transcendental Meditation While Falsely Claiming It Is Not a Religion. By Aryeh Siegel

COLUMNS

FROM THE EDITOR

Vitamin Megatherapy and Respectful Skepticism **4**

NEWS AND COMMENT

Is the Glass Half Empty or Half Full? Latest Results in the Replication Crisis in Psychology / Crater Discovery Story Flawed by Premature Link to Speculative Impact Hypothesis / University of Northern Iowa Cancels Support of FC Conference / Britt Hermes Awarded 2018 Maddox Prize for Courageous Defense of Science / Interstellar Visitor Continues to Behave Strangely / Corso Artifact Decisively Identified—and It's Hardly Ancient / Loftus Receives Dublin's Ulysses Medal / Scott Honored by Paleontological Society. **5**

INVESTIGATIVE FILES

The Saga of Tom Horn

JOE NICKELL **26**

NOTES ON A STRANGE WORLD

The Mind of Leonardo da Vinci, Part 1

MASSIMO POLIDORO **30**

REALITY IS THE BEST MEDICINE

Fake News about Health Products

HARRIET HALL **32**

BEHAVIOR & BELIEF

An Artist with a Science-Based Mission

STUART VYSE **36**

THE SCIENCE OF SCIENCE COMMUNICATION

The Science of Why Yoga Quiets the Mind: Fitness Industry Hype Obscures Yoga's True Benefits

MATTHEW C. NISBET **40**

SKEPTICAL INQUIREE

Bailing in the Mummies

BENJAMIN RADFORD **43**

LETTERS TO THE EDITOR **63**

THE LAST LAUGH **66**

REVIEWS

First Book by the Rogues of the *Skeptics' Guide* a Terrific Read

ROB PALMER **59**

The Skeptics' Guide to the Universe: How to Know What's Really Real in a World Increasingly Full of Fake. By Steven Novella with Bob Novella, Jay Novella, Cara Santa Maria, and Evan Bernstein

What We Know: A Lay Public Primer

RUSS DOBLER **60**

At Least Know This: Essential Science to Enhance Your Life. By Guy P. Harrison

Committee for Skeptical Inquiry

"... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

Vitamin Megatherapy and Respectful Skepticism

My father was a small-town pharmacist, and he always told us that vitamins beyond what our bodies need are excreted out of our systems. So why now, many decades later, is that commonsense lesson so little known and heeded? Billons of dollars are spent on unneeded and worthless megavitamin therapy, and the craze continues. In our cover story, medical researcher Reynold Spector examines this situation, especially regarding irrational use of megavitamins C and E. A noted clinical pharmacologist and former research scientist into the inner workings of the blood-brain and blood–cerebrospinal fluid barriers, Spector is in a good position to judge the misinformation and misrepresentations about megavitamin therapy.

He acknowledges that there are certain rare cases where extra doses of vitamins C and E are needed, but in general the mass use of taking megavitamin doses for those who don't require them is an "unwise and wasteful" practice. It has much in common with other forms of so-called alternative medicine.

Spector didn't tell us this, but I discovered that there is a Reynold Spector Award in Clinical Pharmacology named for him, "recognizing Dr. Spector's dedication and contributions in clinical pharmacology." In retirement, Spector has combined his distinguished biomedical background with explorations of superstitions and misconceptions. This is now, by my count, his seventh article for the Skeptical Inquirer.

* * *

What tone should scientific skeptics take? We skeptics deal, on one extreme, with all sorts of utter nonsense and bilge and, on the other, with widespread subtle misunderstandings and understandable misconceptions—plus everything in between. In "Respectful Skepticism" in this issue, psychologist Craig A. Foster argues for behaving respectfully and even sympathetically toward pseudoscience supporters if we are to have any hope of changing minds. He was pleased to find that a lot of our colleagues at our recent CSICon conference also made this point. It is good advice. It can be difficult to put aside our frustrations seeing people fall for unverified or clearly debunked claims, but we have to put aside those feelings and address the claims themselves and the reasons for their popularity. There success lies.

This is not new advice. We're hardly perfect here at SI and CSI (back to when we were CSICOP), but I think we do fairly well in this regard. We have always been guided by our colleague Ray Hyman's classic document "Proper Criticism" (it's on our website, csicop.org), which offers eight valuable suggestions, including "use the principle of charity." Our founder, philosopher Paul Kurtz, constantly spoke of not judging people and claims prior to investigation. Our famous late colleague Carl Sagan likewise called on his fellow skeptics to guard against "making fun of all those other people who don't see things as clearly as you do" (see his "The Burden of Skepticism," SI, Fall 1987, Sagan's Pasadena CSICOP conference keynote). Our own Guide for Authors, which I wrote, calls for maintaining "a factual, professional, and restrained tone." But it's a lesson we must all keep reemphasizing.

Speaking of CSICon, in this issue we present pages of lively reports and as many photos as we can to convey some of the fun, excitement, and insights from our CSICon 2018 conference in Las Vegas. This year's is October 17–20. See you there.

—Kendrick Frazier

Skeptical Inquirer™
THE MAGAZINE FOR SCIENCE AND REASON

EDITOR Kendrick Frazier
DEPUTY EDITOR Benjamin Radford
MANAGING EDITOR Julia Lavarnway
ASSISTANT EDITOR Nicole Scott
ART DIRECTOR Christopher Fix
WEBMASTER Marc Kreidler
PUBLISHER'S REPRESENTATIVE Barry Karr

EDITORIAL BOARD James E. Alcock, Harriet Hall, Ray Hyman, Scott O. Lilienfeld, Elizabeth Loftus, Joe Nickell, Steven Novella, Amardeo Sarma, Eugenie C. Scott, Karen Stollznow, David E. Thomas, Leonard Tramiel

CONSULTING EDITORS Susan J. Blackmore, Kenneth L. Feder, Barry Karr, E.C. Krupp, Jay M. Pasachoff, Richard Wiseman

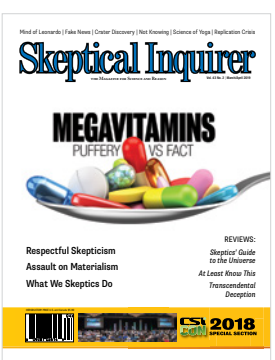
CONTRIBUTING EDITORS Harriet Hall, Kenneth W. Krause, David Morrison, Massimo Pigliucci, David E. Thomas, Stuart Vyse

Published in association with
CENTER FOR INQUIRY

CHAIR Edward Tabash
PRESIDENT AND CEO Robyn E. Blumner
CHIEF FINANCIAL OFFICER Barry Karr
CORPORATE COUNSEL Nicholas J. Little, Brenton Ver Ploeg
SUBSCRIPTION DATA MANAGER Jacalyn Mohr
COMMUNICATIONS DIRECTOR Paul Fidalgo
DIRECTOR OF LIBRARIES Timothy S. Binga
VICE PRESIDENT FOR PHILANTHROPY Martina Fern
EXECUTIVE DIRECTOR, RICHARD DAWKINS FOUNDATION FOR REASON & SCIENCE Robyn E. Blumner
DIRECTOR, DIGITAL PRODUCT AND STRATEGY Marc Kreidler
DIRECTOR, GOVERNMENT AFFAIRS Jason Lemieux
SYSTEM ADMINISTRATOR Cody Hashman
DIRECTOR, TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE Bertha Vazquez

BOARD OF DIRECTORS Edward Tabash (chair), David Cowan, Richard Dawkins, Brian Engler, Kendrick Frazier, Barry A. Kosmin, Y. Sherry Sheng, J. Anderson Thomson Jr., Leonard Tramiel. *Honorary*: Rebecca Newberger Goldstein, Susan Jacoby.

STAFF Pat Beauchamp, Melissa Braun, Matthew Cravatta, Lauren Foster, Roe Giambrone, Alexander Nicaise, Paul Paulin, Michael Powell, Vance Vigrass



cfi CENTER FOR INQUIRY

CFI Mission: The Center for Inquiry strives to foster a secular society based on reason, science, freedom of inquiry, and humanist values.
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

Is the Glass Half Empty or Half Full? Latest Results in the Replication Crisis in Psychology

Tomasz Witkowski

For years a chorus of voices has spoken of a replication crisis in psychology, particularly social psychology. In November 2018, the results of another large replication project called Many Labs 2 were published, which demonstrated that in half of known psychological experiments it is possible to generate results that are similar to—but slightly lower than—the original results. Over a period of several years, 186 researchers from sixty different laboratories on six different continents representing thirty-six different nationalities conducted replications of twenty-eight well-known studies. Over 7,000 participants from diverse cultures took part in each of them. By comparison, the average number of participants in the original studies was 112. The results demonstrated clearly that replicability of experiments is not dependent on cultural context. Brian Nosek from the Center for Open Science, who helped to coordinate the study, claims that their results could prove even more significant than those of the 2015 Reproducibility Project, in which a mere 36 percent of experiments were successfully reproduced.

Studies were selected for replication based on a wide range of criteria, including frequency of citations, demonstrating the impact of a given study on the whole of psychology. Another, more technical criterion was the possibility to conduct the study online via the internet, using a platform accessible to researchers from all sixty laboratories.

Among the experiments whose results could not be confirmed was one demonstrating the Lady Macbeth effect: like the character from the Shakespearean drama, haunted by memories of her own crimes and convinced that she could see traces of blood on her hands, participants asked to recall some behavior associated with a violation of moral norms would have a strong tendency to engage in behaviors involving restoration and maintenance of physical cleanliness. Confirmation was also not achieved of results showing that people growing up with siblings are more altruistic than only children. There was no success in confirming the results of experiments showing that participants performing tasks involving the use of words describing heat are more likely to believe in global warming than those who performed tasks linked with the use of words describing cold. Replication was also not achieved of the famous 2009 experiment by Yoel Inbar showing that people who had first experienced a feeling of aversion were later more homophobic than those from the control group.

Over 7,000 participants from diverse cultures took part in each replication study. The results demonstrated clearly that replicability of experiments is not dependent on cultural context.

However, there was successful replication of the results of a study by the Nobel Prize winner Daniel Kahneman, who together with Amos Tversky discovered the "framing effect," in which people who are in possession of the same information make different decisions depending on the context in which that data is presented to them. Many Labs 2 replicated the results of a study from 2007 on the so-called trolley dilemma. As in the original experiment, here the majority of participants considered it impermissible to shove one person onto the tracks in order to halt a wagon that could potentially kill five people. The trials of replication were also successfully handled by experiments on the primary attribution effect, the tendency to explain behaviors of observed persons in terms of internal and fixed categories (e.g., personality traits), while simultaneously discounting external situational factors.

As always when we achieve a 50/50 result, the trite question comes to mind of whether the glass is half full or half empty. The answer depends not only on our reserves of optimism or pessimism but also on the perspective we have adopted. If we remove our rose-tinted glasses and look at psychology, particularly social psychology, as a science that has for years struggled with methodological problems, beset by scandals surrounding numerous scientific fraudsters, our answer would, perhaps paradoxically, be positive. From this perspective 50 percent is quite a lot, as it means that a significant portion of the general rules discovered by psychology do not depend on cultural context (which is not to say that cultural context has no meaning in psychological experiments). Psychologists until quite recently have not had this certainty, for the majority of study results came from the WEIRDest (Western, educated, industrialized, rich, democratic) populations and mainly from American psychology students.

Another piece of good information coming from the results of Many Labs 2 is that a significant portion of our knowledge on human behavior is independent of the passage of time—the variable that is the bugaboo of so many

social scientists, whose work frequently turns out to be a snapshot of something ethereal. Perhaps this is the case of the study of altruism of only children and those raised with siblings, whose results were not confirmed by Many Labs 2. During the time from which the original study was conducted to the moment the replication was done, there were most certainly changes in the manner in which children are raised and changes in many cultures. Perhaps some functions that the home and family previously performed have been assumed by various institutions. This, in turn, could have led to contacts between only children and their peers being more extensive than in previous times, thus substituting for siblings. However, to determine whether these suspicions are accurate, it would be necessary to conduct a well-designed longitudinal study. The mere replication does not tell us.

The results of Many Labs 2 also reinforce convictions about the importance for study replicability of the effect size uncovered in the original study. Indeed, as it turned out, other factors such as the place of the study, order of tasks, or culture did not exert the same impact on replication results as did effect size. Either something could be repeated everywhere or not at all. We can draw clear conclusions for future research and publication work. The discoveries of the Many Labs 2 team, supplying invaluable pointers to contemporary researchers, give hope that the knowledge referred to by the nineteenth-century mathematician William Clifford as "safe truth" will expand in psychology, while we will learn about the replication crisis during classes on the history of psychology.

Before this happens, however, we should keep in mind that in the field of psychology almost 150,000 reviewed studies are published annually in English alone (144,291 in 2017 according to PsycINFO), making twenty-eight replicated studies over a period of several years a mere drop in the bucket. The perspective of scientists is also not the only one we should take into account when answering the question of how full our glass is. Entirely different is the perspective adopted by the average user of psychological knowledge—practitioners applying knowledge from social psychology in management or in the shaping of social attitudes through advertisements or education. They will ask questions similar to those posed by users of other goods accessible to us. How many forged banknotes in circulation make a currency worthless? What percentage of false entries in Wikipedia would lead to its total uselessness as a source of information? What proportion of defective products will lead people to stop buying goods from a particular company? How much false information can be published by a newspaper before it loses the trust of its readers? Unfortunately, the results of Many Labs 2 mean that half of the pages in textbooks and other volumes used by researchers may contain false information. The problem is, we don't know which half.

Perhaps the inauthenticity of half of the banknotes in circulation is a problem for a currency, just as false information is a problem for the reliability of sources of information. That said, it does not appear that this applies to psychology. In 2018, the American Psychological Association reported that psychology presently enjoys greater popularity than in any other time in history. Every year around 1.6 million first-year students in America take an introduction to psychology course, and this number is growing. Forecasts for employment among psychologists predict a 19 percent increase in the need for psychologists by 2024. There is a similar level of interest in the study of psychology and services offered by psychologists in Europe. Is this growth in interest happening despite the replication crisis or perhaps because of it? Or perhaps both suppositions are true.

Tomasz Witkowski is a psychologist and writer. He is author of *Psychology Led Astray* and coauthor of *Psychology Gone Wrong*. He is the founder of the Polish Skeptics Club and specializes in debunking pseudoscience, particularly in the field of psychology and psychotherapy.

Crater Discovery Story Flawed by Premature Link to Speculative Impact Hypothesis

Mark Boslough

On November 14, 2018, science journalist Paul Voosen reported in the elite journal *Science* on the discovery of a possible impact crater under Greenland's ice sheet. The next day on Twitter he described his effort to break the story after learning about it more than a year earlier. But the scientists had chosen to remain silent until they got a paper through peer review and published in the AAAS journal *Science Advances*, which has very strict embargo rules.

Supporters of the controversial "Clovis Comet" hypothesis were primed to claim the Hiawatha Crater as their smoking gun.

The secret wasn't all that well kept. I'd been hearing rumors about it for the better part of a year. In July, a downloadable paper about the "Hiawatha meteorite crater"—written by many of the same scientists—was published in the journal *Energy Procedia*. It described the crater as "the youngest and undoubtedly best-preserved" impact crater on Earth, citing K.H. Kjær, et al., "in revision," that was finally published in *Science Advances* in November.

By the time the second paper came out, the first one had been retracted because it "contained partially redundant material [that] was still under consideration at *Science Advances*." But the new paper made no claims

A visualization of the Hiawatha crater beneath the northwestern Greenland ice cap derived from satellite imagery and radar. Credit: NASA's Scientific Visualization Studio, NASA/GSFC

about a remarkably young age. According to the abstract: "The age of this impact crater is presently unknown … ." The detailed discussion of its age makes it clear that the tentative age constraints only suggest that it formed during the Pleistocene, adding, "we emphasize that even this broad age estimate remains uncertain … ." In other words, "we don't really know, but we think it's younger than about 2.6 million years."

Supporters of the controversial "Clovis Comet" hypothesis (see David Morrison's skeptical special report, "Did a Cosmic Impact Kill the Mammoths?," SI, May/June 2010) were primed to claim the Hiawatha Crater as their smoking gun. This hypothesis was first suggested in the 2006 book *Cycles of Cosmic Catastrophes* and reappeared in modified form when authors Richard Firestone and Allen West teamed up with other researchers the following year to publish "Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling." They argued that a comet (or broken comet) exploded in outer space over North America exactly 12.9 thousand years ago, destabilizing the Laurentide ice sheet. This started a chain reaction that led to an abrupt climate change to a cold period known as the Younger Dryas. But that's not all. The explosions over North America also created a swarm of descending fireballs that engulfed the entire continent, burning it to a crisp. The combination of incineration followed by freezing led to unfavorable environmental conditions that caused the collapse of the Clovis culture and the extinction of myriad megabeasts, including woolly mammoths, giant sloths, and saber-toothed cats.

Science journalist Paul Voosen added the speculative part back into the first breaking news story that set the tone for virtually all the media reporting to follow.

This impact hypothesis contradicted mainstream science in virtually every field it touched, including astronomy, impact physics, archaeology, paleontology, geology, paleoecology, paleoclimatology, and even crystallography. As someone whose research has focused on experimental and computational impact physics since I was a graduate student in the 1970s, my skepticism was immediate—especially after learning that the swarm-of-descending-fireballs idea was based on a less-than-accurate TV documentary animation of a simulation I had done to test an idea that I had long since rejected. Experts in the other relevant fields were equally skeptical, but each for their own reasons.

After a dozen years and scores of papers, the skeptical consensus hasn't changed. Neither the retracted paper nor the *Science Advances* paper mentioned the Younger Dryas impact hypothesis, let alone tried to link it to the putative Hiawatha Crater. Therefore, I was surprised that Voosen's article about it in *Science* focused on this aspect with the headline "Massive Crater under Greenland's Ice Points to Climate-Altering Impact in the Time of Humans" and was topped by a sensational illustration labeled "A 1.5-kilometer asteroid, intact or in pieces, may have smashed into an ice sheet just 13,000 years ago."

Voosen explained on Twitter that "… this paper spent a long time gestating, passing through more than a dozen reviewers, I believe, who skimmed away the informed speculation. Was that partly due to the possible Younger Dryas tie? Probably. As a coauthor put it, they faced an unfairly high bar." So he added the speculative part back into the first breaking news story that set the tone for virtually all the media reporting to follow.

I will not be surprised if Hiawatha is confirmed as an impact crater. It will eventually be drilled and dated. Based on the evidence and statistical probability, I'm willing to bet that it will turn out to be much older. Regardless of its age, it's unfortunate that such a spectacular story of scientific discovery was tainted by connections to a widely discredited hypothesis and speculations that did not make it through peer review.

Mark Boslough is an impact physicist. After a thirty-three-year career at Sandia National Laboratories, he is now affiliated with Los Alamos National Laboratory and is also an adjunct faculty member at the University of New Mexico. He is a fellow of the Committee for Skeptical Inquiry.

University of Northern Iowa Cancels Support of FC Conference

Many reading this will be surprised to hear that the pseudoscientific practice of facilitated communication (FC) is still being taught at universities throughout the United States. FC, a technique used primarily on people with minimal spoken language abilities, requires a facilitator to support the person's wrist, arm, shoulder, or other body part while typing out words on a keyboard. Reliable testing demonstrates that messages obtained using FC are authored by the facilitator and are not the words of the person with disabilities. While a select number of profoundly impaired individuals may start out needing close instruction by an educator, specialist, or caregiver in the initial stages of learning to use a communication device, evidence-based communication systems and technologies exist that allow those individuals to move toward independent functioning without long-term dependence on a facilitator.

Reliable testing demonstrates that messages obtained using FC are authored by the facilitator and are not the words of the person with disabilities.

Most major health and education organizations have policies against FC's use, including the American Academy of Pediatrics, American Academy of Child and Adolescent Psychiatry, American Association on Intellectual and Developmental Disabilities, and the American Psychological Association. In 2014, the International Society for Augmentative and Alternative Communication (ISAAC) stated that the use of FC appears to be in violation of several articles of the United Nations Convention Rights of Persons with Disabilities. And, in August 2018, the American Speech-Language-Hearing Association (ASHA) renewed its position statement against the use of FC.

Despite this, the University of Northern Iowa (UNI) held its fifth Midwest Summer Institute in June 2018, which featured keynote speakers claiming to be "Master Trainers" in FC (though no formal licensing is required for this title), two sessions on facilitated communication (an introduction and a "getting started"/hands on work session), typing to communicate (FC by another name), and discussions by people with disabilities accompanied by a facilitator typing messages. UNI offered one undergraduate or graduate credit to students for participating in the conference, overseen by the UNI Department of Teaching.

In May 2018, a group of more than thirty educators, researchers, health care providers, communication specialists, science writers, and concerned citizens sent UNI officials a letter expressing their concern over the continued use of FC, along with a resource list of articles and policy statements, in the hope of stopping the conference. University officials ignored the letter, planning to continue the conference in 2019, until the media picked up the story (*The Gazette*, *Forbes*, *Consumer Health Digest*, and *The Daily Orange*, among others). In response to the initial news report, a Cedar Rapids citizen also wrote to the UNI administration, disclosing that he had suffered, first hand, the harms of FC when he and his wife were falsely accused of abusing their child shortly after their son started working with a facilitator. The couple was not allowed to see their son for a period of time. No charges were ever brought against the couple, and, eventually, the family was reunited.

After the conference was held in June, UNI officials decided to form a committee to study the issue. In October 2018, Provost James Wohlpart responded to the group, indicating that the leadership had met to discuss conference practices and agreed to no longer host the conference. According to Wohlpart, the conference was hosted by an outside agency that is not affiliated with the university.

While the group is pleased with this result, UNI has failed to acknowledge that there are current staff members who trained with Douglas Biklen and others at Syracuse University's Institute on Communication and Inclusion, ground zero for FC in the United States. UNI is also where D.J. Savarese, a young man with autism who is featured in the movie *Deej*, was introduced to FC in 2007. This brings into doubt the claim that UNI's affiliation with FC was incidentally limited to the conference.

In October 2018, UNI Provost James Wohlpart responded to the group, indicating that the leadership had met to discuss conference practices and agreed to no longer host the FC conference.

When FC comes under close scrutiny, its proponents often change the name to supported typing, hand-over-hand, rapid prompting method, typing/spelling to communicate, or other inventive terms to mask their continued use of the discredited technique. Hopefully, the administration and staff at UNI will stay true to their word to stop using FC and stand as a model for other universities in demonstrating to people with disabilities and their families a commitment to evidence-based practices within their classrooms.

Britt Hermes Awarded 2018 Maddox Prize for Courageous Defense of Science

Britt Hermes, who publicized her research and subsequent rejection of natural therapies, is the recipient of the 2018 John Maddox Prize. Hermes, a former naturopath, was awarded the inaugural John Maddox Prize for an early career researcher "in recognition of her advocacy and writing on evidence-based medicine—in particular her exposure of false claims made by proponents of naturopathy, which she has highlighted as both dangerous and ineffective."

The Maddox Prizes, named for the late long-time *Nature* editor (and former CSI fellow) John Maddox, are given for courage in promoting science and evidence on matters of public interest, despite smears, threats, and attempted lawsuits. The prize is run and funded by Sense about Science, a London organization where Sir John Maddox was a founding trustee, and the leading scientific journal *Nature*. The Wellcome Collection hosted the awards ceremony. There were 136 nominations from thirty-six countries.

Professor Terry Hughes, a world expert on the Great Barrier Reef who exposed the extent of coral reef damage caused by rising water temperatures, also received a 2018 Maddox Prize.

As for Hermes, the prize announcement said, "The judges were particularly impressed by her willingness to question her own views, the discomfort involved in communicating about the practices of former colleagues, and her continued commitment in the face of lawsuits and personal harassment." It noted she is currently being sued for defamation by an American naturopath in a case to be heard in a German court.

"I was a naturopath, until I looked at the evidence and decided to speak up about the dangerous therapies used in naturopathy, especially those to treat cancer," said Hermes. "Walking away cost me my friends. I am harassed and being sued for defamation. I am honored to be recognized by the scientific community for changing my mind."

University of London Professor Sir Colin Blakemore, one of the judges, said that "Britt Hermes's story is one of exceptional courage—not only to realize that naturopathy, to which she had devoted four years of training, was riddled with bogus practices, but then to criticize these practices in the face of abuse and legal actions."

Another judge, Natasha Loder of *The Economist*, said, "Britt Hermes has fought hard for evidence-based medicine in the face of opposition and ongoing legal challenges. ... All this from someone who is just starting out on a career in science is remarkable."

Hermes spoke at our CSICon 2017 conference in Las Vegas where she gave a memorable talk, "The Bloody Work of Naturopaths" (see SI, March/April 2018, p. 18). Previous recipients of the Maddox Prize include CSI Fellows Edzard Ernst and Elizabeth Loftus.

Interstellar Visitor Continues to Behave Strangely

David Morrison

In late 2017, an interstellar asteroid named 'Oumuamua swept past Earth, looped around the Sun, and departed—the first recorded visit from beyond our solar system (see my "Interstellar Visitor: The Strange Asteroid from a Faraway System," News and Comment, SI, March/April 2018). Its orbit was unique but so was its shape as revealed by its light curve—its variation in brightness as it rotated. 'Oumuamua was highly elongated, with a length at least five times greater than its width. Because it was so small, perhaps 200 meters long, actual images could not be obtained.

By the time of its discovery it was already moving away at high speed, so there was no hope of launching a spacecraft mission for a closer look. Despite the meager data, this unique object has proved an ideal subject for speculation.

The first question was whether it was an asteroid or a comet. The distinction is that a comet outgases volatiles as it approaches the Sun, while a rocky asteroid does not. Telescopic images showed no tail or wisps of gas, so it was classified as an asteroid. However, there is a second way to detect escaping gas: from changes in the orbit. If jets of gas are strong enough, they can accelerate the comet. Careful tracking of 'Oumuamua showed a slight acceleration; on this basis, some scientists began to call it a comet, although a very strange one.

Is there any other way to achieve a change in orbit relative to a path defined purely by gravitation? Spacecraft do this all the time with thruster rockets or light sails. Perhaps inevitably, someone would suggest that this interstellar visitor was actually a spacecraft using some sort of propulsion system. A second mystery was revealed when the highly sensitive Spitzer Infrared Space Telescope failed to detect 'Oumuamua despite a thirty-hour exposure, suggesting that it was smaller and more reflective than originally assumed.

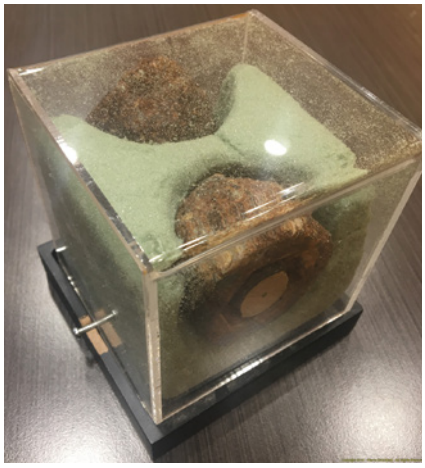
Abraham Loeb, chair of the Harvard Astronomy Department, with Shmuel Bialy, a postdoc at the Harvard-Smithsonian Center for Astrophysics, have suggested the possibility of its being a spacecraft in a paper for the prestigious *Astrophysical Journal Letters*. They write that "'Oumuamua may be a fully operational probe sent intentionally to Earth by an Alien civilization." This speculation got a lot of publicity.

Most astronomers are, of course, skeptical of this idea. We are unlikely ever to know the definitive answer for 'Oumuamua, although astronomers hope to discover more interstellar visitors (asteroids, comets, or alien probes) and to study them before they fade into deep space.

David Morrison is a long-time NASA space scientist and a Skeptical Inquirer contributing editor.

Coso Artifact Decisively Identified—and It's Hardly Ancient

After missing for fifty-seven years, the Coso Artifact has been found. First discovered in 1961 in the Coso Range of eastern California, south of Owens Lake, the Coso Artifact was variously alleged to be physical evidence of ancient aliens or the product of an advanced anti-deluvian civilization or time travelers. It was even featured in a popular episode of *In Search Of…* hosted by Leonard Nimoy. Sliced in half, the object originally (and incorrectly) alleged to be a geode held a small porcelain cylinder inside with a central metallic shaft.



The Coso Artifact is currently stored in a small, transparent, cubicle box, held in place by carved green styrofoam.

During the 1990s, Pierre Stromberg was busy organizing the Pacific Northwest Skeptics group and became intrigued by the Coso Artifact when he attended multiple lectures by young-earth creationist Donald Chittick. Chittick claimed that the artifact could be evidence of a pre-flood civilization that had "internal combustion engines or even jet engines way back then." Chittick was a defense witness who testified in pretrial depositions for the Arkansas "Balanced Treatment Act," which required that "creation science" be taught along with evolutionary biology in that state's public schools.

A 2018 photograph of the Coso Artifact, staged to duplicate one of the original photographs from 1961.

Recalling the *In Search Of…* episode, Stromberg decided to investigate, and by 2000 he realized, with the help of Louisiana State University geologist Paul Heinrich and the Spark Plug Collectors of America, that the Coso Artifact was in fact a 1920s Champion spark plug. Upon revealing his findings, many

The shell allegation was the key claim that propelled the Coso Artifact to the fame it enjoyed.

Loftus Receives Dublin's Ulysses Medal

Elizabeth Loftus has been awarded the Ulysses Medal, University College Dublin's highest honor, given to those whose work has made an outstanding global contribution. It is named in recognition of UCD alumnus James Joyce.

Loftus is Distinguished Professor of psychological science as well as criminology, law, and society at the University of California, Irvine. She is a fellow and member of the Executive Council of the Committee for Skeptical Inquiry.

The medal was presented in November 2018 during the University College Dublin School of Psychology's Sixtieth Anniversary Public Lecture Series, at which Loftus spoke on "The Fiction of Memory."

Conor Healy / Picture It Photography

Ciara Greene (right), assistant professor of psychology at University College Dublin, presents the Ulysses Medal to Elizabeth Loftus in Dublin in November.

in the creationist community accepted his findings and ceased any mention of the artifact. But since Stromberg didn't have physical access to the artifact, there were those who did not accept his findings, including some of the original players involved in the popularization of the artifact. As recently as 2018, some paranormal proponents, such as Erich Von Daniken, continue to promote the artifact in their literature.

In April 2018, Stromberg was contacted by the family of one of the original codiscoverers of the artifact. Aware of Stromberg's research and accepting of his conclusion, the family invited him to physically inspect the artifact. Inspection once again revealed that the artifact is indeed a 1920s Champion spark plug.

One of the halves of the Coso Artifact with a deconstructed 1920s Champion spark plug.

However, the inspection turned up some unexpected information. Long claimed to have "fossil shells" on the artifact's surface that dated back 500,000 years, geologist Heinrich could not identify any such shells.

Stromberg decided to investigate, and by 2000 he realized with some help that the Coso Artifact was in fact a 1920s Champion spark plug.

A second physical inspection was conducted by a geologist with the University of Washington Earth and Space Science department. The second geologist could not find any shells or shell impressions on the surface of the artifact either. Ironically, the disposition of shells on the artifact did not have any relevance to the dating of the artifact itself. But it raises further questions as to the qualifications and competency of the original alleged geologist who claimed there were shells present during the initial inspection in 1961. The shell allegation was the key claim that propelled the Coso Artifact to the fame it enjoyed and helped reenergize the OOPARTs (Out of Place Artifacts) in the late twentieth century.

Further certainty regarding the artifact's true origin came with the discovery that the top of the spark plug was still sticking out of the top of the object, allowing Stromberg to make a detailed verification of the spark plug's make and manufacturer. Pierre Stromberg has provided an extensive analysis of his decades-long research into the Coso Artifact on the Talk.Origins website. In addition, Stromberg has negotiated with the family of one of the original codiscoverers and museum curators to put the artifact on display at Seattle's Pacific Science Center in a new exhibition titled "What Is Reality?"

The Coso Artifact may be of more humble origins than its original proponents may have hoped for, but it cannot be denied that it had an impact on American culture and played a major role in modern pseudo-archaeology.

Scott Honored by Paleontological Society

Eugenie Scott is the recipient of the 2018 Pojeta Award from the Paleontological Society. The Pojeta Award recognizes "exceptional professional or public service by individuals or groups in the field of paleontology above and beyond that of existing formal roles or responsibilities."

Scott, a physical anthropologist and noted educator about evolution, is chair of the advisory council and former executive director of the National Center for Science Education. She is also a fellow and member of the Executive Council of the Committee for Skeptical Inquiry.

Superstars, Timely Insights, Fun: Latest CSICon Was Biggest (and Best?) Ever

KENDRICK FRAZIER

It had superstars: The witty and erudite Renaissance man Stephen Fry in a lively onstage discussion with his fellow English countryman Richard Dawkins. Steven Pinker of *Enlightenment Now!* book fame telling us why things are better than we all think. James "The Amazing" Randi on stage with colleagues who helped create the modern skeptical movement. And Bill Nye "The Science Guy," who just dropped by to ask Pinker a question, greet Randi, and hobnob with fans.

It had timely topics: psychologist James Alcock on how skilled propagandists can create an "us vs. them" mentality and stimulate existing prejudices; Dr. Jen Gunter on Gwyneth Paltrow's vaginal (and other) snake oils; *New York Times* science journalist Carl Zimmer on the potentials and problems of DNA test kits; "Science Babe" Yvette d'Entremont on surviving fake news; health-policy researcher Timothy Caulfield on pop culture's assault on science; zoologist Abby Hafer on why everything you know about sex is wrong (e.g., that gender is binary); political scientist Joseph Uscinski on conspiracy theories; medical scientist Paul Offit on what he got wrong in campaigning for vaccines; science teacher Bertha Vazquez on dealing with creationism in the classroom; "Science Mom" Kavin Senapathy on her own personal path "from reason, to Oz, and back again"; psychologist Susan Blackmore on what out-of-body experiences are about; climate communicator John Cook on the fake news about climate change; genial debunker Mick West on 9/11 microsphere myths; Massimo Polidoro on the mind of Leonardo da Vinci (the subject of his forthcoming book); and—well, you get the idea. That was just the start.

It had humor and even song and music courtesy of multi-talented host George Hrab and his irreverent personal takes on … well, whatever might occur to him at the time.

It had skeptical entertainment: Adam Conover, star of *Adam Ruins Everything*, led off the first evening with a routine built around, yes, parasites, and Banachek was back with his mind-boggling mind tricks that puzzle even most fellow skeptics.

And before the formal proceedings, there were well-attended workshops on climate literacy (Mark Boslough),

Steven Pinker addressing the crowd.

skeptical activism (Susan Gerbic), investigations (Joe Nickell and Kenny Biddle), and health numeracy (William London).

The Saturday evening Halloween Party this time was a pajama party. That allowed the imaginations of scientific skeptics free rein (as if they need more of that)!

The Saturday evening Halloween Party this time was a pajama party. That allowed the imaginations of scientific skeptics free rein (as if they need more of that)!

CSICon 2018, the annual celebration of science and reason by the Committee for Skeptical Inquiry, Skeptical Inquirer magazine, and the Center for Inquiry, had something for everyone. With more than 650 participants gathered at a new and larger Las Vegas conference venue, the Westgate Hotel, just far enough off the strip to seem suitable, it was the biggest—and some said best—CSICon yet.

Before my opening remarks I asked for a show of hands. How many were attending their first ever CSICon conference? Hundreds of hands shot up. We were surprised and delighted. So many new faces! Skeptic Rob Palmer talked to some of these first-time attendees—who came from all over the world. He subsequently published on our csicop.org website "Meet the First-Timers," a fascinating report filled with anecdotes on why they came and how positive their experiences were. (See https://www.csicop.org/specialarticles/show/csicon_2018_meet_the_first-timers.)

Said conference organizer and CSI Executive Director Barry Karr:

> The conference was a great success. Although not the largest conference we've ever had, it was certainly the largest CSICon, with over 650 people. It was great to see so many old friends, and it's always a pleasure to welcome first-time attendees. I think the highlight for me was watching James Randi in conversation with Ray Hyman, James Alcock, and Ken Frazier discussing the founding of CSICOP (now CSI) and the dawning of the skeptic's movement. I am not sure how you can top a line-up like the one we had, but you know we are certainly going to try next year!

Added exuberant Center for Inquiry CEO and President Robyn Blumner afterward:

> CSICon 2018 was a rousing success. People were regularly coming up to me and other CFI staff overflowing with enthusiasm for what they were experiencing. The speakers were tremendous. There were impactful and thoughtful talks but also plenty of humor. This was the best CSICon so far. I simply don't know how it could have been better. Attendees walked away saying they would be back and would bring spouses and friends to the next one.

The next CSICon will be a joint conference with CSI's sister organization, the Council for Secular Humanism, October 17–20, 2019, in Las Vegas at the Flamingo.

For more extensive coverage of CSICon 2018, we next offer adapted excerpts from Paul Fidalgo's session-by-session coverage done live at the time on the CFI Live website. For more, see https://centerforinquiry.org/blog/category/csicon/.

Out-of-the-Box Skepticism: Opening CSICon 2018

PAUL FIDALGO PHOTOS BY BRIAN ENGLER

CSICon is always a big deal. We wouldn't crow about it so much if it wasn't. We call it things such as "the premier skeptics' event" and whatnot because it happens to be true! So even given the cascade of well-earned superlatives we (okay, I) use to describe CSICon year after year, it's already obvious that this year's conference was something else.

Robyn E. Blumner

All these people, from remote locations across the country and around the globe, gathering to celebrate science and reason … and utterly immersing themselves in more. This is a good sign for the future. Nothing but blue skies from here, right?

Eddie Tabash

Well, look, being realists, there was no way to open a conference such as this without acknowledging that those skies aren't as blue as we'd like.

Robyn Blumner, CFI's president and CEO, said that science and skepticism seem to have been "reduced to flotsam and jetsam" in public discourse. But at the same time, it remains that "reason is the most powerful tool for human progress on Earth." Right now, these truths coexist, so all the more reason to be glad for the people we have working on the side of science and reason. (Blumner made a point of thanking CSI Executive Director and conference organizer Barry Karr and the CFI staff, referring to us as "the best team under the climate-change–enhanced sun.")

You see, this is one of the cool things about being a skeptic: one can openly acknowledge unpleasant realities while also *choosing* to find hope and joy in the positive truths. Those are just as real. So the theme underlying the opening of CSICon 2018? *Wow, there's a lot of hard work to do. Good thing there's us.*

Also acknowledging our challenges, Skeptical Inquirer Editor Kendrick Frazier spoke of the adaptability and universality of skepticism, casting skepticism as a way to empower people who might otherwise be disempowered by pseudoscience and misinformation. Rattling off a long list of subjects that the magazine has covered just over the past year, Frazier illustrated how skepticism is applicable, and badly needed, in every realm of thought, in every subject. "You can't fit what we do into a neat box—or *any* box!" Even if you could, why limit skepticism's power?

And that power, the power to think critically and use the tools of science and reason, are open to everyone. And it's *for* everyone.

Eddie Tabash, CFI's board chair, made that point about the wider freethought movement, the community that encompasses skepticism, humanism, and secularism. The work we were doing wasn't just for us, not just to be "right," but to make sure that the rights and freedoms we seek are enjoyed by everyone equally, whether or not they think like we do. Just so, a person doesn't have to be a "skeptic" or jazzed about critical thinking for our movement to want to keep that person from being harmed by pseudoscience, conspiracy theories, and misinformation.

Photo: Susan Gerbic

Kendrick Frazier

One of the cool things about being a skeptic: one can openly acknowledge unpleasant realities while also *choosing* to find hope and joy in the positive truths.

Parasites and Modern Mind Control

The headliner of the first night of CSICon was Adam Conover of *Adam Ruins Everything*, who used the idea of parasites in nature as a metaphor for some of the ways our critical brains are overcome without us ever knowing it.

Adam Conover

Without going too deeply into Conover's standup act and ruining the jokes, I'll just say that he proved that the algorithms of platforms such as Facebook and YouTube are not too dissimilar from invasive fungi that control ant brains and make them either climb up blades of grass so they can be eaten by cows or clamp onto a tree before exploding.

Facebook and Twitter make us mad; YouTube keeps pushing crazier stuff on us, and corporate brands have made it so that we literally can't think of anything without associating it with a product for purchase. We are the explosive zombie ants, unknowingly acting against our own interests.

Encapsulating what he sees as the foundation of his work, Conover said, "We as people are intelligent, have free will, and once we know the truth we can control our behavior for the better." But the power of algorithms and advertising are designed to affect us subconsciously, so that "knowing the truth" becomes much hazier. "Understanding we don't have all that control," he said, "that gives us some power." In times such as these, we'll take it. We can work with that.

We are the explosive zombie ants, unknowingly acting against our own interests.

False Beliefs Handled with Care at CSICon 2018

As the first morning's presentations came to a close at CSICon 2018, our ebullient emcee, George Hrab, commented, "I love that the theme today is understanding." I had been thinking the same thing. If there's a talk at CSICon that hints at being understanding of, and sympathetic to, those who harbor false beliefs in good faith, I'm probably going to put it in block quotes.

But that morning, understanding was the thread that held everything together. It wasn't intentional; these talks weren't arranged to be a "niceness block." It's just that this morning, empathy and introspection were among the main themes.

The most overt examples of the empathetic stance came from Dr. Jen Gunter, who has made a name for herself countering the false and dangerous claims of Gwyneth Paltrow's Goop empire, and Troy Campbell, a psychologist who held the title of "Imagineer" at Disney.

Gunter showed how the con being played on women by Goop is just part of a long history of women being excluded from medicine (as in literally excluded, to the point that in centuries past, women could be neither doctors in life nor cadavers for study in death) and what she calls a "culture of vaginal shame."

Jen Gunter

When Goop sells women magic eggs and coffee enemas, they defend it by saying, "We're only starting conversations" about the products and treatments. Retorted Gunter, "Well then you don't understand language either. A conversation starts with 'Hey, how are you,' not 'Hey, put some coffee up your ass.'"

"I'll be the first to admit there are many problems with modern medicine," said

Gunter showed how the con being played on women by Goop is just part of a long history of women being excluded from medicine.

Gunter, explaining that Goop is taking cynical advantage of modern medicine's gaps. It's difficult to simply blame their customers who are often not armed with the kind of critical scientific literacy they'd need to overcome the Goop message.

Troy Campbell encouraged us to look at why people refuse to believe certain facts. It has nothing to do with their intelligence.

"People want to belong," said Gunter, boiling it all down. "It doesn't matter that their needs aren't being met [by the products]." In a culture where women have long been medically marginalized, Goop's customers feel listened to and cared about. This actually explains quite a lot about our rather perilous political climate.

Similarly, Troy Campbell encouraged us to look at why people refuse to believe certain facts. It has nothing to do with their intelligence. Campbell presented an "implication structure" whereby we understand that acceptance of any fact requires accepting the implications of the fact. "The solution [to a problem] is often the reason for denial."

So how do we get more people on "team science," as he put it? "Start with care," he said. "Love people into it. … Keep your middle finger ready, but also have your hands open when you need to."

This kind of understanding extends to all manner of false beliefs. Writer and investigator Mick West used the example of the 9/11 "Truther" conspiracy theorists who believe that the towers of the World Trade Center were brought down by controlled demolition and was "an inside job."

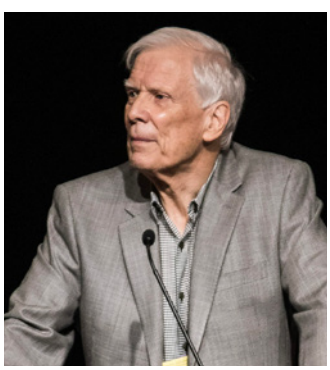
Amid many examples of how to make iron microspheres at home for fun (though probably not profit), West was adamant that 9/11 Truthers mean well—they truly believe they possess a crucial truth about one of the most tragic and traumatic moments in modern history, and they've gotten themselves lost in a rabbit hole of science-y-sounding, reaffirming misinformation.

Craig Foster of the U.S. Air Force Academy had been doing research on pseudoscientific belief at a Bigfoot conference and found not a bunch of crazies or fools but people who were open to hearing from those who didn't think exactly as they did, who were eager to aid Foster in his study but feel that the institutions of science have been unfair to their preferred field of inquiry. This doesn't make the Bigfoot believers correct, but it dispels some of the uglier stereotypes about those who cling to pseudoscientific beliefs. Foster discovered that, like CSICon attendees, they are folks who want the opportunity to hang out with people who think like they do.

New York Times science writer Carl Zimmer even showed us how susceptible actual scientists can be to false beliefs, as he told of the truly jaw-dropping history of the study of genetics and heredity. Clouded and distorted by prejudices, groups of people who were already marginalized, from immigrants to petty criminals, were considered to be congenitally bad and that their problems could be traced back through their ancestry. These attitudes led to what became American eugenics, which in turn influenced the position of Nazi eugenicists who decided that undesirable genes could be dealt

Mick West

Paul Offit



James Alcock

with only through killing.

Jumping back to the very first presentation of the day, James Alcock introduced us to the component parts of false beliefs. Alcock was talking specifically about propaganda, but its ingredients for success are right in line with the transmission of all false beliefs. They appeal to emotions and to existing fears and prejudices, the cultural context of who we consider to be more "trustworthy" regardless of the content of their words, and our propensity to accept the first thing we hear about a subject as the truth. All this and more make all of us vulnerable. "Even we have made some real boo-boos when it came to critical thinking in our own lives."

At the special lunch presentation, virologist Paul Offit recounted several of his experiences with the media and doing battle with vaccine deniers. But early in his talk he also happened to repeat the theme of the day. "Be sympathetic, no matter how trying the circumstances." Lesson, I hope, learned.

Deborah Hyde

Improving the Narrative: Enlightenment and Illusions

I want to believe. Not in UFOs but in the power of enlightenment and the better angels of our nature. I want to believe that humans have the power to overcome the limitations of our narrowly focused senses and use our squishy little brains to bring ever-improving well being to the people with whom we share this mote of dust suspended in a sunbeam.

Steven Pinker believes, and he has two books full of evidence to back it up. In an era when everything looks to be blatantly and obviously going terribly wrong, Pinker's optimistic message is the ultimate contrarian take of our time. Is he right? (By the way, with this report is a picture of him shaking Bill Nye's hand that I just happened to catch at just the right moment. You're welcome.)

Well, he's not wrong about the things that have gotten better. It's unmistakable, in measure after measure, in almost every way one can think to gauge the well-being of our species, things are looking up. Now, you have to zoom back at least a few decades, if not a few centuries or millennia, to see the trend lines move in a positive direction, but up they indeed go.

But it doesn't *feel* like it, does it?

Let's put Pinker's presentation at CSICon 2018 aside for the moment and jump to the mind-bending demonstration of visual illusions presented by Susana Martinez-Conde and Stephen Macknik. These two neuroscientists provided example after example of how just unbelievably awful we are at perceiving the world as it actually exists.

Oh, you thought that was a set of circles? Nope! It was squares. OR WAS IT??? Now they're actually squircles. WHAT DOES THAT EVEN MEAN???

Or: Oh, you thought those balls were rolling up toward the top of a ramp all by themselves? Nope! You were just looking at it wrong, and they were really rolling down like balls ought to do. See it now? OF COURSE YOU DON'T BECAUSE YOUR BRAIN WON'T LET YOU.

And as we rub our sore, sprained brains, Stephen Macknik taunts us with observations such as, "Looks good. Shouldn't. Does."

It all kind of went like that.

As Macknik put it, "Your brain would rather defy the laws of physics than show you the world as it really is."

In an era when everything looks to be blatantly and obviously going terribly wrong, Pinker's optimistic message is the ultimate contrarian take of our time.

Photo: Paul Fidalgo

Bill Nye "The Science Guy" shaking hands with Steven Pinker.

Well that sounds like a lot of people with enormous power that I know.

"The brain is limited," said Susana Martinez-Conde, "and we don't have the resources to process the vast amount of sensory data that comes in."

In other words, it's hopeless! We simply cannot perceive reality in full. We can approach it, can approximate it, and come to a collective consensus about it. But as Macknik said, "We're constantly just sliding on the ice."

So here's the Pinker-esque "turns out" moment about all this. Our brains evolved to best handle all this sensory data to our benefit. After all, a brain can only get so big and demand so many calories. So it makes do. When there are blanks in what we can perceive, our brain tries to fill them in. It looks for structure, making the bet that a structure exists at all. It "improves narratives."

Oh, now that's interesting, isn't it? "Improves narratives." Let's let our limited brains churn on that for a moment.

At the beginning of the afternoon, we heard from Deborah Hyde on the subject of vampires and how on earth people ever came to invent and believe in such things. As is often the case with such things, many of our ideas about vampires can be traced to attempts to explain what we otherwise could not: disturbing behavior, claims of night visitations, deforming diseases, and death. Putting herself in the shoes of some medieval European trying to explain some odd activities, she mused, "What shall we do? These people are doing some really weird shit."

So the myth of vampires developed to fill in these gaps, to find a structure, to improve the narrative.

Susana Martinez-Conde, one of the neuroscientists, said, "Illusions are part and parcel of how we see the world."

The question remains: Are things actually getting better? Right now, it really doesn't seem so. But perhaps that's because of the limitations of our brains. We can't possibly see the whole picture. Not only can we not look at all peoples throughout history in a non-abstract way to get the "correct" perspective, we can't even process the torrent of information we get about this very moment in time.

Are things actually getting better? Right now, it really doesn't seem so. But perhaps that's because of the limitations of our brains.

Steven Pinker

Pinker also reminds us that we are all subject to a negativity bias (he used the example that people tend to think that tornadoes cause more deaths than asthma attacks when the opposite is true), and our information diet from the news is limited to stuff that did happen (a tornado killed some people), while never telling us about what didn't happen (another month with no deaths by tornado!).

Unlike vampires, enlightenment is not a myth, Pinker tells us. It is not only true, but it belongs to all of us. The benefits of reason, science, and humanism are empirically measurable, and we don't need to simply trust our lyin' eyes.

You know, those same eyes that also told us the balls were rolling up when they were really rolling down.

So maybe it's okay if we feel like things are out of control, even if they're not, because our brains need to fill in the gaps. We have to be careful not to go too far in our pessimism, or we start thinking that all news is fake news, that balls really do roll up, or that vampires stalk us in the night. Instead, we can temper our transitory dread with the gentle reminder that we aren't actually seeing the whole picture. And thanks to the tools we've forged with science, we can get better at grasping what is and is not so, improve our narrative in actual fact, and sense the progress that we are truly making.

It Has Always Been a Matter of Trust

Whom do you trust? I suppose the default response of a skeptic could be "no one," at least until particular claims can be verified. It may go without saying, however, that the answer "no one" also applies to conspiracy theorists and others who buy into various forms of pseudoscience. They also probably think that they are ready to trust someone once their claims have been verified. We just have different ideas of what constitutes "verified."

As we heard at CSICon 2018 from political science professor Joseph Uscinski, conspiracy thinking has become a major component of our public discourse, which is not news. But what might be news is his observation that conspiracy thinking cuts across all demographics: gender, age, class, and so on.

If there's no demographic delineator, there does seem to be a line drawn between, bluntly, the winners and the losers. Those who feel they are on the outs in terms of power and influence are much more likely to buy into conspiracies than those who are not. When you don't trust the sincerity or intentions of the people in power, you're liable to buy into some fairly outlandish claims.

So it seems that the cultivation of trust needs to be a priority for skeptics who want to see some sort of resurgence of reason.

Yvette d'Entremont (a.k.a. the SciBabe) has an approach that might be hard for some: being an open book. "I need you to understand that there are people who do not want to be questioned for what they do," she said, speaking of the peddlers of harmful pseudoscientific nonsense. So if she's going to adopt a stance by which she ruthlessly seeks the truth behind those who are not happy to be fact checked, she has to be willing to be open about herself as well.

To make the point, she showed a progression of images of herself, going from sans makeup to the full application of the "SciBabe" mask. "This is part of my avatar," she said, and by being open about the fact that it is an avatar, by offering transparency, she can begin to earn trust.

Trust is earned in some pretty insidious ways by less-principled actors ("actors" both in the sense of someone executing an action and in the sense of a person who plays pretend in front of people for a living). Timothy Caulfield, whose book is literally titled *Is Gwyneth Paltrow Wrong About Everything?*, spoke to us about "tokens of legitimacy," the gestures of credential that propagators of the dubious use to make people believe that they not only know what they're talking about, but that they know more than anyone with traditional (actual) credentials.

"SciBabe" Yvette d'Entremont

Kavin Senapathy

Massimo Polidoro

Celebrity endorsements are of course a major token of legitimacy, but it gets even more insidious, such as the fudging of resumes or stuffing sketchy journals with shoddy "studies" that claim to prove some product or therapy's efficacy.

These tokens of efficacy are more effective than one might think, because it's not as though they work only on people who "don't know any better," as it were. Remember, as Uscinski pointed out, conspiracy thinking does not discriminate.

Kavin Senapathy, one of the new hosts of CFI's *Point of Inquiry* podcast, had an atheist upbringing and a life immersed in science, yet she was still vulnerable to the emotional appeals and the tokens of legitimacy from hucksters such as Dr. Oz. Today Senapathy is a respected skeptic leader, but there was a journey to be made to get here.

"Tribalism and dogma are the enemy," said Senapathy, "and religion is a subset." Tribalism and dogma, like conspiracy thinking, can infect any group, even those whose identity is based on fighting tribalism and dogma. To foster more trust

James Randi and Stephen Fry

in the skeptic point of view, skeptics need to be careful that they don't fall victim to their own biased tunnel vision.

"We as skeptics must embrace not only that data and evidence that we wield to champion our pet issues," she said, "but data that affects all marginalized peoples." The experience of people outside of skeptics' majority demographics (women and people of color, for example), said Senapathy, must not be dismissed.

Indeed, as we learned from zoologist Abby Hafer, a lot of the things even we smart, educated folks take for granted about gender, sex, and what's "natural" is really quite sad. (And what I learned about how male ducks behave toward females makes me very, *very* sad.) Likewise, Susan Blackmore, in a presentation on out-of-body experiences, urged us to avoid "negative skepticism" that seeks only to debunk or dismiss and shuts off curiosity. There is so much in human (and nonhuman) experience to mine for new data!

Susan Blackmore urged us to avoid "negative skepticism" that seeks only to debunk or dismiss and shuts off curiosity.

These messages aligned well with the presentation from Massimo Pigliucci on the perils of scientism, a stance in which science is applied to domains to which it does not apply, and its superiority in those domains is asserted. By allowing "science" to become so elastic that it comes to mean the pursuit of any knowledge having to do with facts spreads science too thin. Pigliucci said that we run the risk of over-promising and under-delivering on science's power and importance.

"It's all a matter of trust," he said. "The public has to trust science … if we lose trust, we get in trouble."

Timothy Caulfield addresses the audience.

Playing Gracefully with Ideas: Stephen Fry, Evolution, and Leonardo

Massimo Polidoro described a certain someone as "a precious jewel" of a person, whose company and insights were sought by the wisest of leaders. This person "swam upstream," eschewing fads and seeking to discover the truths and communicate those truths to others. This incredible human being exemplifies the term *Renaissance person*.

Polidoro was talking about Leonardo da Vinci (about whom he is writing a biography), but he could easily have been talking about two of the speakers in the Saturday afternoon pre-

sentations at CSICon 2018.

First there is the educational powerhouse Bertha Vasquez, whose secret identity is that of a mild-mannered middle school science teacher but whose superhero persona is that of the director of CFI's Teacher Institute for Evolutionary Science (TIES).

According to Polidoro, Leonardo was among those figures of science who, like the best artists, were rebels. Just as Galileo confronted the dogma of a geocentric universe and Darwin upended any notion of humans as spontaneously created, so Vasquez fights in the most perilous of trenches for the integrity of science and the education of young Americans.

Indeed, Vasquez has raised TIES up to become a powerful and prolific force for good, having put on over 100 workshops for middle school science teachers in forty-two states over just three years of existence.

Vasquez will tell you that the content is what matters, that it's the material and information provided in these workshops that prepares teachers to navigate the teaching and defense of evolution in the most culturally resistant areas ("I have kids who turn their chairs to the walls when I teach evolution," she said to much shock), but watching her on stage at CSICon, it's clear that TIES also owes much of its success to the force of her presence and personality.

Her enthusiasm for her subject is utterly contagious. Her drive to learn, discover, and share her knowledge is undeniable. She's a true Renaissance woman.

Another figure Polidoro might have been speaking of when he talked about the reverence Leonardo inspired in his contemporaries is the "national treasure" of England, as Richard Dawkins called him, Stephen Fry. An internationally beloved actor, novelist, essayist, and even pioneering podcaster, Fry sat in conversation with Dawkins, lightly moderated by CFI's Nick Little, whom Eddie Tabash referred to as our "super-lawyer."

Fry discussed the various ways different cultures throughout history have dealt with things such as myth and progress.

From left: Stephen Fry, Nick Little, and Richard Dawkins

Prompted by Dawkins, Fry discussed the various ways different cultures throughout history have dealt with things such as myth and progress. (Fry's latest book is *Mythos*, a retelling of the Greek myths.) Holding the ancient Greeks as a kind of ideal, Fry noted how they seemed not to take their "religion" literally and valued a ceaseless cultivation of new ideas. When religion is treated as more allegorical, Fry said, the assignation of personality and will to forces beyond human comprehension "is as much art and literature as it is religion."

For the Greeks in particular, Fry heralded a mode of thinking wherein gods and the heavens were ideals to strive for, not a literal description of reality. Fry mused on the value of ritual and how the "brand power" of things such as religious institutions or the British monarchy can serve as symbols before which even those in power must humble and justify themselves.

Like Leonardo, Fry is certainly a Renaissance man. "Skepticism really means alertness," he told the CSICon audience, advising us, "Be alive to an idea. An idea is a living thing."

Fry recalled the words of Oscar Wilde (whom Fry has played to great acclaim on film), who spoke of "the ability to play gracefully with ideas." This is an ability he shares with Bertha Vasquez, who has the grace to inspire young minds and shepherd evolution education through the roughest terrain.

To play gracefully with ideas is something to strive for indeed. As Polidoro said of Leonardo, so we hope it may be said of so many of us: "He was a man who woke up very early, when everyone else around him was still asleep." ■

Paul Fidalgo is the communications director for the Center for Inquiry (CFI). In addition to covering CSICon live each year for CFI's website (see https://centerforinquiry.org/blog/category/csicon/) and other projects, he writes CFI's daily digest of news, *The Morning Heresy*, and CFI's biweekly *Cause and Effect* electronic newsletter. He holds a master's degree in political management from George Washington University.

You Can't Fit What We Skeptics Do into a Neat Box

KENDRICK FRAZIER

We scientific skeptics, we skeptical inquirers, do it all. I am sure one of us somewhere is right now going after some extraordinary claim none of us has even heard of yet, studying it in depth and critiquing it with all the tools of science and skepticism. She—or he—will soon let the rest of us know the results (we hope in SI). Equally likely is that others are synthesizing complex information that might give us a better understanding of, say, how our brains work—both to achieve brilliant creativity or to deceive or elude us.

We are complex creatures, we human beings, and I think we all share an endless fascination for discovery and the unknown. And we continue to ponder how simultaneously some inquiring people can achieve great, provable insights while others go off the rails into fringe science or pseudoscience or—worse—antiscience or fake science.

We are complex creatures, we human beings, and I think we all share an endless fascination for discovery and the unknown.

I am writing a book about science and pseudoscience (and antiscience). Throughout it, I attempt to contrast science and pseudoscience by describing actual science and how it works as well as the values that guide good science. (I include an entire chapter on "The Values of Science," which are closely related to the values of skepticism I have talked about in this space before.) I feel strongly that by portraying the *real* adventure of *real* science and some of its astonishing findings—and how we achieved them—we can help others more clearly identify pseudoscience or bad science. And we can help people see where pseudoscience fails us and falls far behind, a kind of sterile (yet strangely appealing to some) intellectual garbage heap.

That brings me to a related point that I think most skeptics appreciate. Our skepticism is always guided by the evidence, and that evidence is obtained by scientific thinking and empirical investigation. While we might make mistakes, we can't go too far off course if we stick closely to the methods and values of science and of good skeptical investigation—and then focus on the evidence. We combine the potent methods of science and skeptical inquiry and emphasize the *quality* of the evidence (or lack of it). Now that is a powerful recipe for sifting out sense from nonsense, the real from the unreal, and for advancing real knowledge.

I said we skeptics do it all. If you doubt that, just take a look at the variety of topics we've covered in the Skeptical Inquirer in just the past year. They range from conspiracy theories to legitimizing woo; from facts and myths about Roswell seventy years later to a skeptics' guide to understanding and combatting racism; from claims of "free energy" to the troubling war on science and knowledge; from drug therapy hype to twenty-one reasons Noah's flood never happened; from acupuncture to homeopathy to vagina quackery; from the return of repressed memories to our weird inability to accept that things may be getting better (progressophobia); from wondering how much we should be concerned about recent flat-earth claims to a report of an actual doctoral dissertation advocating a flat Earth—and then to our own IIG group's demonstration of Earth's curvature to incredulous flat-earth believers; from multi-level marketing schemes to

how superstition and myth are creating an apocalypse for Africa's large mammals; from a taxonomy of ghosts to facts versus fears about radiation; from our self-centered ideas about aliens and UFOs to sloppy fear-mongering studies about cell phone radiation; from Hollywood curse legends to how belief develops and compels (the God Engine); from the myths of endless energy (such as cold fusion, whose thirtieth anniversary is this year) to the decline of creator belief; and so it goes.

Those are just a few examples. And that listing doesn't even include special articles on our website not published in SI. Nor does it include the presentations at our lively CSICon conferences or the countless blogs and podcasts produced by skeptics here and abroad or what skeptical organizations in other countries around the world take on. Multiply that by hundreds, by thousands, of topics big and small. We skeptics do it all.

Note that we cover both very specific claims that generate considerable popular interest and much broader issues and common misconceptions that have wide social or cultural implications. We have always done that. We always will. Some readers are naturally interested more in one end of this spectrum. I get amused and bemused when a reader complains that we have seemingly changed some policy and gone a certain new direction he or she disagrees with. Just wait until our next issue, I want to answer. Our work has to be taken in total. Over several issues the topics we focus on and the approaches we take cover that entire broad spectrum.

We like to get at the truth, as best as possible. Science is by far the best tool for that.

Another point: I submit that whatever stereotypes other people may have about skeptics, they are wrong. And *waaaay* too narrow. You can't fit what we do into a neat box (or any box). We love science and discovery; we enjoy life; we have all sorts of outside interests. Most of us are good-natured. And we like to get at the truth, as best as possible. Science is by far the best tool for that.

Skepticism is a crucial part of science; it is a crucial part of everyday critical thinking. Without it we couldn't long survive. And we who pursue it more seriously than the rest because we find it both interesting and very important can come from any background, be of any gender, be young or old, or hail from any part of the world. It is inclusive: it is open to everyone.

The only requirement is a commitment to science and reason, to evidence, and to the quest for truth. ■

Kendrick Frazier is editor of the SKEPTICAL INQUIRER. This commentary is expanded and updated from his welcoming remarks at CSICon 2018 in Las Vegas.

SCIENCE AND THE PUBLIC

Earn your master's degree in Science and the Public through the University at Buffalo and the Center for Inquiry!

Explore the methods and outlook of science as they intersect with public culture and public policy. This degree is ideal for enhancing careers in science education, public policy, and science journalism—and prepares you for positions that involve communicating about science.

This unique two-year graduate degree program is entirely online. Take courses from wherever you are in the world at your own pace! Courses include: Science, Technology, and Human Values; Research Ethics; Critical Thinking; Scientific Writing; Informal Science Education; Science Curricula; and History and Philosophy of Science.

UB Science and the Public
Co-Developed by UB Graduate School of Education and the Center for Inquiry
cfi CENTER FOR INQUIRY

For details visit: ed.buffalo.edu/teaching/academics/masters/science-public.html

Embracing Option D: Knowing When You Don't Know

BENJAMIN RADFORD

I am often asked to examine seemingly mysterious and inherently ambiguous photos. Usually the person asking has already settled—sometimes tentatively, more often strongly—on a specific interpretation. They *know* what the photo shows and want my independent confirmation that their favored interpretation is correct. That shadowy blur in the distant forest is a Bigfoot; that weird white orb—complete with faint facial features if you just magnify enough—is a ghost, and so on.

One of the first steps to analyzing a photograph, and more broadly a claim, is carefully distinguishing between what is *known*, what is *suspected*, and what is *assumed*. The three are often casually lumped together, but parsing them out is important. Usually key premises are possibilities instead of established fact. Considering alternative explanations is another part of the process.

If you've taken any standardized multiple-choice tests such as the GRE, LSAT, or ACT, you probably remember that some of the questions offered a tricky option, usually after three or four possibly correct specific answers. This is some version of "The answer cannot be determined from the information given." This response, often Option D, is designed in part to thwart guessing and to see when test-takers recognize that the question is insoluble or the premise incomplete.

One of the first steps to analyzing a photograph, and more broadly a claim, is carefully distinguishing between what is *known*, what is *suspected*, and what is *assumed*.

The principle can be generalized from a test question to a premise or assertion in the real world. It's difficult for many people—and especially experts, skeptics, and scientists—to admit they don't know the answer to a question. Even if it's outside our expertise, we often feel as if not knowing (or even not having a defensible opinion) is a sign of ignorance or failure.

Yet there are many examples in our everyday lives when we simply don't have enough information to reach a logical or valid conclusion about a given question, and often we don't recognize that fact. We routinely make decisions based on incomplete information, and unlike on tests, in the real world there are not always clear-cut objectively verifiable answers to settle the matter.

This is especially true online. Few people bother to chime in on social media discussions or threads to say that there's not enough information given in the original post to reach a valid conclusion. Social media practically requires that people express firm opinions—but of course there's no requirement that anyone actually know what they're talking about, no paragraph 86 in the Terms of Service affirming that any comments you make will be informed or even comprehensible.

I thought about this recently when I saw a viral meme of a photo depicting a set of apartment doors in front of a wide set of exterior steps. The path in front of the door on the left-hand side of the photo had been cleared off, and there were a few inches of snow on the steps in front of the door on the right. One

typical caption read "Please don't ever allow yourself to become the person on the left." Others added phrasing such as "Taking selfishness to a new level!" and hundreds or thousands of people complained about the lazy neighbor on the left, some adding idle speculation about the person's politics.

This was not a quirky psychological test like the 2015 photo of a dress that was black and blue or white and gold depending on your priming and perception. Nor was it intentionally ambiguous and misleading, like a photo of blue-and-tan object that could be a

As social media users are wont to do, they used the photo as an opportunity to signal their virtues and publicly register their dismay at the boorish world.

a beach (or painted door edge) widely shared in early 2018. This was instead a seemingly straightforward candid photo depicting obviously inconsiderate behavior. Had an identifiable tenant been mentioned or seen, he or she would likely have been publicly shamed online.

As social media users are wont to do, they used the photo as an opportunity to signal their virtues and publicly register their dismay at the boorish world. A valuable lesson, to be sure ... but few pointed out that the correct answer might be Option D.

I recognized a litany of assumptions people were making, including that both apartments were occupied (nothing in the photo suggests that anyone lived in the apartment on the right); that the person on the left had shoveled the snow in front of their door (it could have been done by a maintenance worker or kind neighbor aware that no one lived in the apartment on the right); and so on. Maybe the neighbor on the left is elderly or infirm and could only shovel their own side. It's even possible that there *is* no "person on the left"—that both apartments are empty, but the building management planned to show the place on the left to a prospective tenant that day and asked maintenance to clear a path to that apartment.

Could or should whoever shoveled the left side have done the right as well? Probably. Maybe. I don't know, and neither do you. No one is suggesting inferring zebras instead of horses from hoofbeats; a lazy neighbor is certainly a plausible explanation, but it's hardly the only one.

Alternative Explanations

We don't really have enough information about the circumstances of the photo, and it seems no one bothered to track down the source for more information. Why would they, when the photo seems so self-evident? In the beach/door illusion mentioned earlier, the photographer enjoyed the publicity before revealing it was in fact of a beach; the orientation had been changed and photo lightly manipulated to mask its identity.

The reactions to the snowy steps image highlighted the desire to make moral judgments about people we don't know based on incomplete information. We can talk about what we would have done—or what we *think* we would have done—but we don't know the circumstances. That car zooming past you on the road might be a jerk—or he might be rushing to the hospital with his pregnant wife or bleeding child in the back seat. That panhandler asking for change might be too lazy to get a job—or he might have some unseen disability that keeps him from holding one down. We make prejudiced assumptions about people and their actions all the time, and we may in fact be right. But unless we get more information, we can't *know*.

Noting that a premise needs more evidence or information to complete a logical argument and reach a valid conclusion is a form of skepticism.

Choosing Option D isn't admitting ignorance; it's the opposite. Recognizing that we don't have enough information to reach a valid conclusion demonstrates a deeper and nuanced understanding of the issue. Noting that a premise needs more evidence or information to complete a logical argument and reach a valid conclusion is a form of skepticism. Anyone can choose options A through C on a test or pick a side of some online outrage fest. But not everyone can recognize when they *can't* know. ■

Benjamin Radford is deputy editor of the Skeptical Inquirer and research fellow for the Committee for Skeptical Inquiry.

[INVESTIGATIVE FILES JOE NICKELL

Joe Nickell, PhD, is, like Tom Horn, a former Pinkerton detective. This is his fiftieth year as a paranormal investigator. He became CSI's senior research fellow in 1995.

The Saga of Tom Horn

Is the Hanged Man's Ghost Still at Large?

At the turn of the twentieth century in Wyoming, the "range wars" claimed many victims, among them fourteen-year-old Willie Nickell (yes, one of my distant cousins).[1] This is the story of his murder and the hanging of his killer—a legendary lawman and now "ghost." It begins over a quarter of a century earlier in my home county of Morgan in eastern Kentucky.

The Range Wars

In 1875, Willie's father Kelsey P. "Kels" (or "Kelse") Nickell went west from his Kentucky home to join the U.S. Cavalry, spending much of his time there as an Indian fighter. In fact, his company was encamped just fifty miles south of the Little Big Horn River on June 26, 1876, when General George Armstrong Custer and his men were massacred. Kels Nickell was one of two troopers dispatched to reconnoiter the site, and he reported the overwhelming stench of dead men and horses. Following his discharge in 1880, he opened a blacksmith shop at Camp Carlin, Wyoming, and the next year married a young woman named Mary Mahoney, who, like her husband, was of Irish descent. They homesteaded a ranch at Iron Mountain where they eventually raised eight children (Nickell 1998).

Tom Horn braiding a rope in the Laramie County jail office in Cheyenne, 1902.

In time, the Nickell family became embroiled in a range war between open-range cattlemen on the one hand and sheepherders and homesteaders on the other. The violence involved vigilante slayings of suspected cattle rustlers and altercations between individuals. In one such incident in 1890, Kels Nickell was charged with "cutting and wounding in attempt to kill" a cattle baron named John C. Coble. Coble's cattle had overrun Nickell's land, and the men quarreled. Another man and Coble, armed with a rock, pursued Nickell, who defended himself. He was jailed, but the charges were eventually dismissed and hard feelings continued. At a meeting of big ranchers, a proposal to lynch Nickell was voted down, but other plans were discussed. All the while Nickell, who knew of the meeting, sat inside the door of his cabin with his rifle across his knees (Nickell 1998; Ball 2014, 170–172).

The unsolved slayings of two ranchers and as many suspected cattle rustlers were followed in July 1901 by a warning note posted on Kels Nickell's ranch gate: "Take your sheep and get out, or meet the same fate as Matt Rash and Isam Dart" (the alleged rustlers) (Nickell 1998).

Murder from Ambush

Just eight days later, on July 18, 1901, Kels Nickell's fourteen-year-old son Willie set out on an errand, wearing a hat and coat and riding his father's horse. He failed to return, and the next morning his younger brother discovered his blood-soaked body at the open gate. Willie had been shot in the back,

almost certainly mistaken for his father.

Funeral services for the boy were held on Sunday, July 21. Kels Nickell knelt by the open grave and vowed to avenge the death. An inquest was held the following day, and the three physicians who had performed the autopsy testified that Willie had been shot twice and that the bullets—which were not recovered—were apparently of large caliber. A surveyor who had diagrammed the crime scene concluded the killer laid in wait at a distance of about 200 feet. At the inquest, the name of a cattlemen's hired gun elicited much discussion.

In time, the Nickell family became embroiled in a range war between open-range cattlemen on the one hand and sheepherders and homesteaders on the other. The violence involved vigilante slayings and altercations.

Then, several days later on August 4, Kels Nickell was himself shot at from ambush. As he ran a zig-zagging course toward the safety of his home, he was hit in the arm, side, and hip. His youngest daughter had been with him but was unscathed; the would-be assassin, obviously a good shot, was not shooting at her. Nickell's brother-in-law got him to a hospital in Cheyenne, saving his life.

Had it been Kels who had been killed and not Willie, the crime might have gone unsolved. Kels has been described as "red-headed and combative," with "an uncanny ability to offend just about every neighbor" (Ball 2014, 263). But the murder of the boy provoked an immediate clamor for justice. The public outcry persuaded the Laramie County sheriff to enlist the aid of the deputy U.S. marshal for southern Wyoming, Joseph LeFors. Marshal LeFors went on leave to devote time to solving the murder.

Although the first suspects in the case were neighbors with whom Kels Nickell had feuded, Jim Miller and his two sons, they were soon eliminated from suspicion. Not only did they have an alibi, but LeFors had examined the scene after Kels's wounding and found hoof prints of a single horse. These led through a gate, onto a road, and in a direction away from, not toward, the Miller residence. LeFors's attention was now drawn to the hired gun whose name had come up at the inquest. The man, reportedly bragging of his deeds, was something of a legend in his own time. His name was Tom Horn. (The name would eventually be given to a Hollywood movie starring Steve McQueen in the title role.)

The Investigation

Tom Horn was the quintessential cowboy: a former trail-herd crewman, prospector, Army Indian fighter, and interpreter—serving as such at the surrender of Geronimo (Ball 2014, 11–98). Afterward, he had apparently worked as a hired gun, then underwent training to become a full-time "operative" of the Pinkerton National Detective Agency. However he was fired for being too rough (Siringo 1927, 240)—or as he said in his autobiography, "My work for them was ... too tame for me" (Horn 1904, 259–263). Following service in the Spanish American War, he went to Cheyenne to recuperate from Yellow Fever—courtesy of John Coble (with whom Kels Nickell had fought). There, often given to drink, he revealed a dark side to his personality (Ball 2014, 199–217, 251; Raine 1949, 89).

The gunslinger had drawn attention to himself from his association with Coble and his reported bragging about killing people. Marshal LeFors was assisted in the Willie Nickell murder case by a female Pinkerton operative hired by prosecutor Walter Stoll. She had first posed as a reporter, roaming the Iron Mountain country, although the terrorized folk mostly refused to talk. She next played the role of LeFors's wife, and the two sleuths pursued a woman believed to have information. When they got her alone and plied her with her favorite highballs, she told how she had carried sandwiches to Tom Horn as he lay in hiding for his quarry to come into his sights.

To attempt to cinch the evidence, Marshal LeFors developed a clever strategy. An acquaintance of Horn, he wrote to him on the pretext of helping him seek employment as a "stock detective" to chase rustlers. Horn accepted LeFors's invitation to meet with him in Cheyenne. It was January 1902, some six months after the murder of Willie. To carry out his plan, LeFors secretly placed a deputy sheriff and court stenographer in a room adjoining the sheriff's office. After drinks at a saloon, the pair retired to the office where they could, supposedly, talk more privately.

LeFors's attention was now drawn to the hired gun whose name had come up at the inquest. The man, reportedly bragging of his deeds, was something of a legend in his own time. His name was Tom Horn.

Horn was in an expansive mood. As he bragged to someone he thought a like-minded individual (both men had been range detectives), LeFors skillfully steered the conversation to the slaying of Willie Nickell, and Tom Horn made highly incriminating statements. These were secretly recorded in shorthand by court reporter Charles Ohnhaus. For example:

> LEFORS: Have you got your money yet for the killing of [Willie] Nickell?
> HORN: I got that before I did the job.
> LEFORS: You got $600 for that. Why did you cut the price?

HORN: I got $2,100.
LEFORS: How much is that a man?
HORN: That is for three dead men, and one man shot at five times. Killing men is my specialty. I look at it as a business proposition, and I think I have a corner on the market.

Stenographer Ohnhaus worked throughout the night to transcribe and type the ostensible confession. Sheriff Smalley obtained a warrant the following morning, Monday, January 13, 1902, and he and the undersheriff found Horn at the Palace Hotel. Smalley walked up casually and said "Hello," as he quickly yanked Horn's pistol out of his waistband. The outlaw detective was immediately taken to the Laramie County Jail—where he would spend the remainder of his life, twenty-two months (Ball 2014, 282–309).

From the time of Willie Nickell's murder, the fame—or infamy—of Tom Horn has attracted paranormal and other pseudoscientific claims.

Justice Done

At Horn's surprisingly short trial (October 10–24), Prosecutor Stoll introduced a blood-stained sweater Horn had accidentally left at a store in Laramie. He had ridden there hurriedly following the murder in an apparent attempt to give himself an alibi. In addition to the stenographically recorded admission of Horn to LeFors, there was testimony of a witness that Horn had bragged to him: "I am the main guy in that Nickell case. ... That was the best God damned shot I ever made. ..."

The jury returned its verdict on October 24: "Guilty of murder in the first degree." On November 12, Judge Richard H. Scott, denying the defense's motion for a new trial, sentenced Horn to death by hanging. Both the Wyoming Supreme Court and the governor (after a thorough review) denied Horn's appeal. Horn had not helped his case by briefly escaping (on August 9, 1903). His head grazed by a bullet and surrounded by citizens, he gave up and was returned to jail (Ball 2014, 300, 332–398, 405).

On November 20, 1903, the court's sentence was finally carried out, despite rumors that the prisoner would be sprung from jail. Horn's last visitor had been John Coble who, the *Denver Post* had reported, had attempted to coerce his ranch hands into falsely testifying for Horn; his foreman resigned instead. Kels Nickell had been refused permission to witness the hanging, but he was wisely allowed to view the body afterward at the mortician's to quench other rumors of a substitute having been hanged.

Paranormalities

From the time of Willie Nickell's murder, the fame—or infamy—of Tom Horn has attracted paranormal and other pseudoscientific claims. Some of his admirers were so desperate to set him free that they not only made false confessions—but also appeals to mystical thinking.

For example, Denver clairvoyant Frank D. Hinds sent the governor a copy of a "Psychometric test and Psychic message." Hinds reported that he had received a visitation—not from a ghost but from some alleged psychic extension of the killer, described as "a dark complected youth ... , age 22, height five feet seven and one-fourth inches, weight one hundred and forty-four pounds." A skeptic observed at the time that the alleged specter suspiciously resembled a Nickell neighbor, one of the Miller boys—an obvious attempt to throw suspicion elsewhere.

Graphologists—purveyors of the pseudoscience of divining character from handwriting (Nickell 1996, 17–22)—have weighed in at various times. Perhaps the earliest was Louise Rice, who believed that Horn's pen movements showed him "affectionate, loyal, and kind-hearted." She was emphatic that "the hanging of such a man was unjust." On the other hand (so to speak), a later analyst concluded that Horn's script revealed he "acted on impulse, sometimes violently," and was a "discontented man" who harbored considerable "resentment." The diviner continued, "Horn had a conscience and knew right from wrong," although his "urge to inflict injury was difficult to restrain" (qtd. in Ball 2014, 452).

Graphologists—purveyors of the pseudoscience of divining character from handwriting—have weighed in at various times.

The purely superstitious have called attention to the number 13, which supposedly influenced Horn's fate. For example, it was observed that Judge Scott—in presenting instructions to jurors—provided fifteen points for the defense but, for the prosecution, a fateful thirteen. And newspapers claimed that Friday the 13ths were conspicuous in Tom Horn's final days (Ball 2014, 360, 452). In fact, however, during 1901, 1902, and 1903, we discover there were just six such dates (respectively two, one, and three for those years), and none was associated with significant events in the case—not, for example, the murder of Willie, the wounding of his father, the secretly recorded confession, Horn's arrest, jury selection, trial commencement, verdict, death sentence, Horn's failed jailbreak, or his hanging. The closest Friday the 13th connection would appear to have been that of November 13, 1903, but it was only the *day before* the governor denied Horn's appeal. Such attempts to fit evidence to a preconceived notion—typically involving counting the hits and ignoring the misses—is

called confirmation bias (Nickell 2012, 12).

No doubt the most enduring superstitious belief involving Horn is that his ghost was unleashed by the gallows. Not long after the hanging, the *Daily Leader* hyped, "Ghostly sounds Disturb Prisoners in County Jail and suggest Phantom Hanging"; perhaps imagination simply got the best of prisoners, none of whom wanted "to live in a dead man's quarters." Iron Mountain folk reportedly saw the ghost of both Willie Nickell and Tom Horn, the latter reportedly "condemned by his misdeeds to ride his old range forever" (Ball 2014, 424, 452). These tales incorporate common folklore motifs (or story elements), including "gallows ghost," "noises caused by ghost," "murderer cannot rest in grave," "murdered person cannot rest in grave," and so on (Thompson 1989, 428, 439, 441, 442). Furthermore, the power of suggestion was employed in folk practice when mothers adopted Horn as a bogeyman, invoking his name against children's misbehavior, as in "Hush, or Tom Horn will get you" (Ball 2014, 452).

More recent accounts are recorded. Cheyenne's Wrangler Western Store—in a landmark three-story building dating from 1882—is allegedly one haunting site. According to *Haunted Cheyenne* (Pope 2013, 44), "a cowboy ghost" is seen there, coming up from the basement and wandering around the first and second floors. The specter "must be Tom," says the manager, since Horn "apparently was held in the basement of the Wrangler while awaiting his trial ..." (Landreth 2013). In fact, however, as penned in Sheriff Smalley's record book, Horn was lodged in the Laramie County Jail on Monday, January 13, 1902—the day of his arrest—and (except for the brief jailbreak) remained there in an upper-level cell until he was hanged (Ball 2014, 309–310). The Wrangler's ghost must be an impostor.

The hanged man's gravesite—located in Columbia Cemetery in Boulder, Colorado (where his brother Charles lived)—has also been claimed to be haunted. According to a pre-Halloween article in *Colorado Daily* (Kale 1999), "Word has it that western-era Boulderite Tom Horn (who was hung for his crimes), can still be seen swinging from the trees of the cemetery." Accompanying the text is a photo of the grave that shows a transparent cowboy ghost. Of course Horn was *hanged* not "hung," and the photo was deliberately faked (its credit line acknowledges the "model" and the supplier of the "cowboy outfit").

I visited the gravesite in 1998, taken there by some local Rocky Mountain Skeptics, including my old friend Bela Scheiber. I had been visiting the area, and we were having breakfast in an old mining-hall-turned-restaurant in the foothills of the Rockies. While eating my *huevos rancheros*, I was asked if I knew who Tom Horn was. Leaning across the table, I replied with mock intensity, "Tom Horn murdered my cousin!" "Oh, that's right," the startled skeptic responded. "He killed a Nickell boy!" And so we agreed to go to the cemetery so I could begin to investigate the alleged haunting site and carry out a little ritual. As it happened, I was still recovering from having badly broken my leg in Spain, so I could only manage a sort of hop and skip, but we all agreed I had "danced on Tom Horn's grave." It somehow seemed appropriate. ■

Note

1. William "Willie" Nickell was a son of Kels Nickell who was, in turn, a son of John Desha Nickell (himself a murder victim during the Civil War). Willie's great-grandfather, Joseph, and my fourth-great-grandfather, John, were brothers (sons of Joseph Sr.). Willie was my third cousin twice removed.

References

Ball, Larry D. 2014. *Tom Horn in Life and Legend*. Norman: University of Oklahoma.

Horn, Tom. 1904. *Life of Tom Horn: Government Scout and Interpreter*. ... Denver: Louthan Book Company (for John C. Coble).

Kale, Wendy. 1999. Haunted Boulder. *Colorado Daily* (October 27).

Landreth, Teri. 2013. Are there really any ghosts in Cheyenne? Available online at http:1063CowboyCountry.com/are-there-really-any-ghosts-in-Cheyenne/; accessed February 11, 2015.

Nickell, Dennie, ed. 1977. Who were Tom Horn's victims? *Yesterday in Wyoming* (October-November): 22–38.

Nickell, Joe. 1996. *Detecting Forgery*. Lexington: University Press of Kentucky.

———. 1998. Historical sketches: The murder of Willie Nickell, in three parts. *Licking Valley Courier* (West Liberty, Ky.) (June 25, August 13, and September 10). (This relies largely on Nickell 1977 and Patterson 1982.)

———. 2012. *The Science of Ghosts*. Amherst, NY: Prometheus Books.

Patterson, Richard. 1982. *Wyoming's Outlaw Days*. Boulder, Colorado: Johnson Books, 37–43.

Pope, Jill. 2013. *Haunted Cheyenne*. Charleston, SC: Haunted America.

Raine, William MacLeod. 1949. *Famous Sheriffs & Western Outlaws*. Garden City, NY: Garden City Publishing Co.

Siringo, Charles A. 1927. *Riata and Spurs: The Story of a Lifetime Spent in the Saddle as a Cowboy Detective*. Boston: Houghton Mifflin.

Thompson, Stith. 1989. *Motif-Index of Folk-Literature*, vol. 2 of 6 vols. Bloomington: Indiana University Press.

You can make a lasting impact on the future of skepticism when you provide for Skeptical Inquirer in your will.

The Committee for Skeptical Inquiry and Skeptical Inquirer are leading voices of critical thinking in fields ranging from homeopathy to paranormal claims. You can take an enduring step to preserve their vitality when you provide for Skeptical Inquirer in your will.

Your bequest to the Committee for Skeptical Inquiry, a program of the Center for Inquiry, Inc., will help to provide for the future of skepticism as it helps to keep Skeptical Inquirer financially secure. Depending on your tax situation, a charitable bequest to the Committee may have little impact on the net size of your estate–or may even result in a greater amount being available to your beneficiaries.

A variety of arrangements are possible, including: gifts of a fixed amount or a percentage of your estate; living trusts or gift annuities, which provide you with a lifetime income; or a contingent bequest that provides for Skeptical Inquirer only if your primary beneficiaries do not survive you.

For more information, contact: Martina Fern, Vice President for Philanthropy, at (716) 636-7571, ext. 426. All inquiries are held in the strictest confidence.

Skeptical Inquirer
The Magazine for Science and Reason

CSI
Committee for Skeptical Inquiry

[NOTES ON A STRANGE WORLD

MASSIMO POLIDORO

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

The Mind of Leonardo da Vinci, Part 1

This year marks the 500th anniversary of the death of Leonardo da Vinci, the "universal genius" and, since I have been working a lot on him (two of my books in Italian on Leonardo just came out, and I am lecturing everywhere about him), I thought I would share with my readers some glimpses into the mind of this extraordinary man.

The First Drawing

Look at the drawing reproduced on this page. It is considered the oldest surviving drawing by Leonardo da Vinci. It was drawn in 1473 and depicts a Tuscan landscape, maybe near Vinci, the small town close to Florence where Leonardo was born. This drawing is considered the first "pure" landscape in Western art: a landscape that is drawn not to be the background of some religious scene or a portrait. It is the first time (at least the first documented occasion) where a landscape was drawn just for the sake of it.

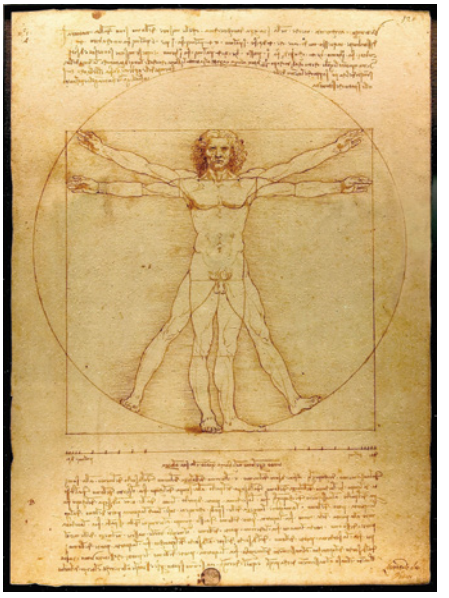
You can see that it was drawn quickly but with a precise hand: there are hills, trees, some castles in the distance, and water. Water especially is something that fascinated Leonardo for all of his life, and it's already here, in his first drawing. But what is also interesting is the writing on the back of the drawing. In Leonardo's backward handwriting it says: "I, staying with Anthony, am happy." (Anthony was probably the husband of Leonardo's mother.) It was, in fact, his grandparents who raised him, even though his parents were both alive; this fact is a key to understanding his upbringing and his very original way of thinking.

Leonardo da Vinci's name is enough to immediately evoke a kaleidoscope of images that have become icons of our times.

A Masterpiece of Nature

You see? We have barely started, and Leonardo's extraordinary story has already taken us!

And Leonardo da Vinci is truly an extraordinary figure. His name is enough to immediately evoke a kaleido-



scope of images that have become icons of our times: *The Mona Lisa*, the *Vitruvian Man*, the *Last Supper*, the *Lady with an Ermine*, etc. And then there are his anatomical studies, his inventions, the parachute, the submarine, the wings to fly, etc.

When he was still alive, he was already considered not only a genius but a masterpiece of nature. Every contemporary biographer described him as a beautiful man in appearance, engaging, elegant, with a fascinating ability to enchant and entertain his audience. They could listen for hours to his reasoning and his stories, and he was also a great musician: he could play the lyre and compose and sing improvised verses on the spot—a reason every powerful man wanted him at his side.

Raphael, who was younger and greatly admired him, put Leonardo at the center of his *School of Athens*, the famous fresco in the pope's apartment at the Vatican, and he drew him as Plato, the greatest of all philosophers. Because Leonardo did not limit himself to just brilliant painting but also studied nature—from the human body to the stars—many critiqued him for wasting his time.

When Leonardo was still alive, he was already considered not only a genius but a masterpiece of nature.

The King of France, Francis I, wanted Leonardo all for himself in the last years of the artist's life, even though he had stopped painting. Francis wanted him near just to have the opportunity of conversing with what he considered to be the greatest mind that ever lived.

According to legend, Francis was holding Leonardo when he died, for there could be no other possible death for such a man than to breathe his last in the embrace of the king himself.

Celestial Influences?

The legends started right after Leonardo's death, when he was quickly transformed into a real-life godlike figure. Giorgio Vasari, who was not a great painter but notable for being the first art historian, was only eight years old when Leonardo died, but he had the chance to meet many who knew Leonardo. In his book on the lives of the great artists, Vasari describes Leonardo almost as a supernatural being:

> The greatest gifts are often seen, in the course of nature, rained by celestial influences on human creatures; and sometimes, in supernatural fashion, beauty, grace, and talent are united beyond measure in one single person, in a manner that to whatever such an one turns his attention, his every action is so divine, that, surpassing all other men, it makes itself clearly known as a thing bestowed by God (as it is), and not acquired by human art. This was seen by all mankind in Leonardo da Vinci.

For Vasari and many others after him, if Leonardo had so many talents it was thanks to the "celestial influences," because God himself chose him and favored him. Later, in the nineteenth century, there would be others seriously claiming that Leonardo had signed a pact with the devil.

But for those who do not believe in supernatural intervention, the fundamental question remains: How could Leonardo become an immortal figure, still recognized today, 500 years after his death, as the symbol of universal genius? What was his way of thinking that made him so original?

Because Leonardo did not limit himself to just brilliant painting but also studied nature—from the human body to the stars—many critiqued him for wasting his time.

Swimming Upstream

A defining trait was Leonardo's tendency to swim upstream. He was an illegitimate son; his father, a notary public in Florence, had him after a short romance with a girl from Vinci named Caterina. He did not marry her, since he was already promised to a girl from a wealthy family in Florence.

Leonardo was raised by his grandparents and had no formal academic education, for illegitimate sons could not follow a regular course of studies and could not be admitted in the notary public's guild. He was always described as very elegant, but he did not follow fads. He was left-handed, a homosexual, and probably a vegetarian—perhaps the first vegetarian recorded in Western history.

Leonardo really seems to be the portrait of everything that is opposite to what was considered to be proper behavior in his times (and probably today there still are some who would greatly disapprove of him). But it is this characteristic—the fact that he did not go with the flow and was quite secure in his choices—that made him unique. And, as we shall see in the next issue, even before science became what we know it to be today, he was already a scientist.■

[REALITY IS THE BEST MEDICINE HARRIET HALL

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician, a CSI fellow, and an editor of the *Science-Based Medicine* blog. Her website is www.skepdoc.info.

Fake News about Health Products

One of my biggest pet peeves is advertisements for bogus health-related products deceptively presented as news stories. These appear regularly in many newspapers, including my own local paper the *Tacoma News Tribune*, and they typically fill a half page. They usually include the words *advertisement* or *paid advertisement* in small print that is easy to miss. In every other way—format, typeface, appearance, reporter byline, pictures, organizational affiliations, and so on—these fake news stories are indistinguishable from real news stories.

It got to the point that I opened the daily paper dreading to see how many of these fake news stories it contained. Occasionally I found none, but most days there were one, two, or even three of them. I started keeping a list. I got angry enough to critique a few of them in articles on the Science-Based Medicine website. They were a constant aggravation. Then one day I realized the newspaper had raised the subscription rates and my credit card was being charged $82.34 every month. I had been paying nearly $3 a day for very little real news and way too much fake news. I'd had enough! I cancelled my subscription.

They didn't want me to go. They offered to reduce the subscription rates. That just made me angrier. If they could reduce the rates, why hadn't they already done that? They kept insisting. They *really* wanted me back. Finally, they asked how much I would be willing to pay. I told them I didn't want it at any price (I should have asked if they would be willing to *pay me*). I no longer get the daily paper. I don't miss it. My life is more tranquil now, and my blood pressure is lower. But it still annoys me that naive readers are being fooled by fake news.

Many of the fake news stories are attributed to organizations with credible-sounding names. These organizations either don't exist or are copycat variations intended to be confused with actual reputable news organizations such as the Associated Press wire service.

Dr. Al Sears has developed and sells bogus health products featured in fake news ads.

Fake Reporters

Many of the fake news articles name the reporter in a byline. I had not heard of any of them, and a Google search did not recognize any of these individuals as reporters with credible reputations for writing about health or science. In fact, it had no information about most of them. Do these people even exist? Are they pseudonyms? Invented names for nonexistent people? Hacks for hire? In one example posted online a fake news story is printed right alongside a real news story by a reputable, prize-winning medical journalist, Marilynn Marchione. If the newspaper doesn't recognize the difference, how can readers be expected to?

Fake Organizations

Many of the fake news stories are attributed to organizations with credible-sounding names, such as National Media Syndicate, Associated Health Press, Health News Service, National Network Media, National News Syndicate, and National Health Syndicate. These organizations either don't exist or are copycat variations intended to be confused with actual reputable news organizations such as the Associated Press wire service.

Co-Opting Dr. Oz

I have now spotted the same picture in four different fake news stories that are actually ads for four different products developed and sold by Dr. Al Sears, an MD who practices "integrative medicine" and is a self-proclaimed anti-aging specialist. The picture shows Dr. Sears and Dr. Mehmet Oz photographed together at a health and wellness festival in Florida. The picture is evidence that they were there together but nothing more; the stories are careful not to make any further claims. But it is obvious that they want readers to assume that Dr. Oz endorses Dr. Sears's products. I don't think he does.

The four products are Re-Nourish, Restore, Omega Rejuvenol, and Ultra Accel.

"Baldness Reversed in Clinical Trial: New Hair Sprouts in 30 days," touts one headline. Re-Nourish is a spray to reverse baldness that was allegedly developed by Dr. Sears based on a discovery by the Harvard Stem Cell Institute. That's very misleading. A doctor at Harvard examined hundreds of substances in the pipeline that nourishes stem cells and found one of them so important that he went on record as saying, "Without it, you're dead in 30 seconds!" The clinical trial was of niacin; Re-Nourish itself has not been clinically tested. Dr. Sears offers stem cell treatments, but Re-Nourish is not a stem cell product; it only contains ingredients said to nourish stem cells. It is highly unlikely that Dr. Oz would endorse anything to do with new, untested stem cell treatments, since he has spoken out strongly against stem cell clinics that offer expensive, unproven treatments. And the article he wrote on hair-loss treatments doesn't mention stem cells or niacin or Re-Nourish. It concluded, "The only product on the market that is absolutely proven to work and FDA approved is Minoxidil."

Dr. Al Sears's "Primal Force Ultra Accel II"

Dr. Sears offers stem cell treatments, but Re-Nourish is not a stem cell product; it only contains ingredients said to nourish stem cells.

Restore: "Better than Botox: Takes 10 Years Off Your Face in Just 10 Minutes." This cream uses a special delivery system to supply nutrients that allegedly eliminate fine lines and wrinkles permanently. The fake news story references a clinical trial of Madonna lily leaf stem cell extract that improved skin luminance and tone around the eyes. The Restore product itself has never been clinically tested.

"CoQ10's Failure Leaves Millions Wanting" and "World's #2 Smartest Man Reveals Secret 'Genius Pill.'" These are both fake news stories about Omega Rejuvenol, an anti-aging and brain-boosting supplement based on omega-3 from krill and squid oils. As I explained in my *Science-Based Medicine* article, Dr. Sears makes exaggerated claims for its benefits, but his claims are not supported by evidence.

The product Ultra Accel II is allegedly a "youth-restoring pill" that could increase the human life span to 146 years (I wish!). There are some preliminary results indicating benefits for mice but no scientific evidence to support any claims for human benefits.

Dr. Sears's *Modus Operandi*

On the HighYa website, a review of Dr. Sears explains how he works:

> [He] takes 1 or 2 studies that:
>
> • May not have been peer reviewed.
>
> • May conflict with the wealth of other clinical studies already completed.
>
> • May not ever have been repeated.
>
> • May not have even been performed on humans, or in some instances, were performed only in a Petri dish.
>
> … and then extrapolates this to reach some conclusion that's far outside the scope of the trials he's referencing.

Other Fake Pictures

Most of the fake news stories are illustrated by photographs that are probably stock photo images. Some are generic pictures of doctors and patients. Some say "models are used in all photos to protect privacy." Some are pictures of pills that bear no resemblance to the pills being advertised. Pictures are good for getting the reader's attention, but they just add to the confusion.

Fake Information

Some of the statements in the fake news articles are false; others are misleading. They offer testimonials. They report animal and test tube study results that may not apply to humans. They report positive results in clinical studies, but these are usually studies of a single ingredient rather than of the product itself or even of the mixture of ingredients in the product. The results are far from impressive, and they neglect to mention other studies that were negative. They post X-rays and illustrations that do not depict what they claim to show.

The products in these fake news stories are alternative medicine treatments, usually dietary supplements. Treatments that have been tested and proven to work are not called "alternative." They

are called "medicine." Real medicines don't need fake news ads like these.

Products Aimed at Older Readers

Younger folk are more likely to get their news from electronic sources than to subscribe to a daily newspaper. Newspaper subscribers are likely to be older. The fake news items are not aimed at young people but at problems we face as we grow older. They offer better sex, better erections, better memory, better sleep, longer life, relief of arthritis pain, reduced prostate symptoms, better eyesight, weight loss aids, bladder control, blood pressure control "without drugs," a "joint pain vaccine," healing psoriasis, relieving nerve pain, and a natural cure for constipation that "removes toxins" *what toxins?* and "cleanses the colon" *why would it need cleansing?*

The headlines for these fake news stories are sensationalist, too good to be true, and not substantiated in the text:

- "Doctors Predict End of Prostate Problems by 2021."
- "Pills May Replace Diapers and Padded Underwear At Stores."
- "Drug Companies Fear Release of the New AloeCure."
- "Leading Acid Reflux Pill Becomes an Anti-aging Phenomenon" (Aloe vera)
- "A 'Miracle' Discovered by the US Navy Could Flush Your Arteries Clean Of All Life-Threatening Arterial Plaque" (EDTA)
- "Doctors Across the U.S. Call It 'The Breakthrough That Changes Everything.'" (phosphatidylserine)

Treatments that have been tested and proven to work are not called "alternative." They are called "medicine." Real medicines don't need fake news ads like these.

Disclaimers

The required FDA disclaimer statement usually appears at the bottom of the page in print too small for the average elderly person to read. It says, "These statements have not been evaluated by the FDA. This product is not intended to diagnose, treat, cure, or prevent any disease." Sometimes it adds that all doctors mentioned were remunerated for their services. Some say "Results atypical. Your results may vary" and others that "In order to assure confidentiality, identifying details, scenarios have been changed, modified, or fictionalized." They expect readers to either not read the disclaimers or to dismiss them, thinking "Oh, they're required to say that; it doesn't mean anything."

Incentives to Buy

They don't want you to wait and think about it or wait to ask your doctor. They want you to buy *right now* and usually offer a hotline with a special discount valid for forty-eight hours only. They say they will have to shut down the hotline after forty-eight hours to restock. They say the hotlines are often busy, so if you don't get through, keep trying or you will end up having to pay full price. They may say only a limited supply is available and if you don't buy now you may have to wait until more is available, which could take weeks.

They offer money-back guarantees, sometimes even double money-back guarantees, but it may not be so easy to get that money back. It's always a good idea to check online for customer complaints and Better Business Bureau reports. Sometimes they rope you in to a convenient monthly delivery so you'll never run out, and customers complain that it is next to impossible to get the recurring credit card charge cancelled. Some offer free gifts if you buy now, including books, reports, and even other bogus products.

Violating Journalism's Code of Ethics

Journalists have codes of ethics, and these fake news stories clearly violate them. I understand that newspapers need advertising income. But I can't condone the newspapers disguising these ads as news stories and making it hard for readers to distinguish real news from fake news. They are deliberately misleading their customers with false information about health. Shame on them! ■

An example of a stock photo like those that appear in fake news items about health products

LEAVE *a* LEGACY *of* REASON

Imagine a future where science and reason serve as the foundation for our lives.

A future where free expression is guaranteed everywhere around the world.

A future where old sectarian divisions have been overcome by the common bond of secular ideals.

This is the future CFI is working toward. Together, we can achieve it. It's never too early to consider a planned gift—*a legacy of reason*.

Call today to reserve your copy of our new gift-planning brochure—a helpful guide through the many options available to you.

Then speak to your trusted financial advisor or attorney. It's as simple as that.

IT'S EASY

Call **Martina Fern** today at **1-800-818-7071 x426** for your copy of this valuable information, or email her at **mfern@centerforinquiry.org.** There's no obligation.

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

An Artist with a Science-Based Mission

Janyce Boynton is a Maine collage artist who sells her work through her website (www.pineconeandsparrow.com/) and at local shows, but she is also a tireless advocate for science. She would never have predicted that science and skepticism would become such an important part of her life, but something happened to her over twenty years ago that set her on this path.

My first contact with Boynton was probably about ten years ago. I was a psychology professor at a liberal arts college when I got a message from Boynton identifying herself as the "facilitator in the W_____[1] case" and offering to speak to my class. She must have known that I would understand what that meant, and although I did not follow up with her at the time, it is clear to me now that she was well into her personal mission at that point. It has been a long and, at times, difficult journey.

In the early 1990s, Boynton was a speech therapist working in Maine. One of the students she worked with was a non-speaking high school girl with autism whom I will call Wendy. An educational technician who also worked with Wendy introduced her to a new communication technique called facilitated communication (FC). The technician had been trained in the method and was using it with Wendy with great success.

Janyce Boynton with one of her collages.

FC is based on the theory that many people with profound language deficits suffer from a physical problem but are not cognitively impaired.

As readers of this column will recall (see "Autism Wars," November/December 2018), FC is based on the theory that many people with profound language deficits suffer from a physical problem—an inability to produce the sounds for speech or the movements required for writing or typing—but are not cognitively impaired. According to this theory, these individuals can't get their ideas out of their broken bodies. FC supporters claim this problem can be solved by having another person—a facilitator—hold the student's hand or arm and guide it over a keyboard. If the facilitator could just steady the non-speaking person's hand, the intelligence hidden within could emerge. Facilitated communication spread rapidly, and with the help of their facilitators, many previously non-speaking people began writing poetry and performing at grade level in school.

Some of Wendy's teachers were skeptical of the technique, but after getting some training from the educational technician, Boynton gave it a try. The results were remarkable. This student who had never spoken a word was now typing out intelligible sentences and carrying on conversations. Boynton had some initial doubts about her technique and whether she was influencing what Wendy said, but she dealt with that uncertainty by getting formal training in FC at a workshop offered at

a local university. She came back from the training feeling more confident that she was doing it right and that the words typed on the keyboard were coming from Wendy.

All of this was fine until one day Boynton was working with Wendy in her office, and Wendy typed out some messages that suggested she had been sexually abused. Boynton found this quite concerning and reported it to Wendy's special education teacher, who set in motion the school system's standard protocol for cases of reported sexual abuse. Wendy was interviewed by a police officer and a Department of Human Services (DHS) counselor, with Boynton serving as her facilitator, and in response to more specific questions from the DHS counselor, Wendy typed out very graphic descriptions of sexual abuse.

A facilitator and student demonstrating FC on a tablet. (YouTube screenshot)

Howard Shane demonstrating the double-blind method used to test the validity of communications obtained through facilitated communication. A screenshot from a YouTube copy of the PBS *Frontline* program "Prisoners of Silence" (Palfreman 1993).

After this interview, Wendy and her brother were removed from their parents' home, and an attorney was assigned as guardian *ad litem* for Wendy. The guardian focused in on the central question: Who is doing the typing? Are the words coming from Boynton or Wendy? The question was relevant because the two were always in physical contact: Boynton was guiding Wendy's hand. Boynton believed that the words were all coming from Wendy and that she was just there to steady Wendy's hand, but now that there were accusations of abuse, it was important to be certain.

To answer this question, the guardian brought in Howard Shane, director of the Center for Communication Enhancement and the Autism Language Program at Boston Children's Hospital. With Boynton serving as facilitator, Shane performed a battery of now-familiar double-blind tests used to evaluate FC. In one situation, Wendy was asked to identify pictures of familiar objects. On some trials both Boynton and Wendy saw the same picture, but on other trials, they were shown different pictures. In each case, the answers typed matched the pictures Boynton saw, not what Wendy had seen. In another part of the test, Shane asked Wendy several very simple questions about her everyday life—but questions whose answers were unknown to Boynton (e.g., "What color is your family's car?"). None of these questions were answered correctly.

The results could not have been clearer. Whenever Boynton did not know the correct answer, the answer given was wrong. Simple double-blind testing showed that Boynton was doing the typing, not Wendy, and as a result, Wendy and her brother were reunited with their parents. Furthermore, the results were so overwhelming that Boynton was also convinced. And so began a very challenging period for her.

The results could not have been clearer. Whenever Boynton did not know the correct answer, the answer given was wrong. Simple double-blind testing showed that Boynton was doing the typing, not Wendy.

Three Difficult Questions

Boynton needed to come to grips with three questions: First, was FC real? Second, if not, then how could she have been so completely fooled? And, finally, why sexual abuse? To her credit, she answered the first question very quickly. Boynton was a trained speech and language therapist, and when she saw the results of the testing, she recognized what it meant. FC was a fraud. In addition, the testing had been a very stressful experience for her. She had never facilitated in a situation like that before, and when she didn't know the answer to a question Shane was posing, she found herself mentally searching for an answer she thought Wendy might give. She realized there was something wrong with this, and as a result, even before she saw the data, the testing process raised doubts in her mind. After the findings of Shane's testing were revealed, Boynton stopped using FC and went on to convince the school administration to implement a system-wide prohibition on its use. The administration had not taken a stand on whether FC was valid or not, but at Boynton's insistence and out of an abundance of caution, they banned the use of facilitated communication in the school system until more was known.

The next two problems took more time to sort out. The sexual abuse aspect was very embarrassing, but in hindsight Boynton had an idea about where it might have come from. In the days prior to the sexual abuse report, Wendy exhibited an increase in violent hitting and scratching. Boynton had never been hit by Wendy or any other student before, but on one occasion Wendy hit her quite hard in the face. She also scratched Boynton, sometimes drawing blood. When a student shows a sudden change in behavior, it is not uncommon for special education staff to hypothesize that something at home is upsetting the child. Of course, in any given case, there are many possible reasons for the change in behavior, but when

other explanations don't come to mind, teaching staff sometimes imagine that circumstances at home are the cause of the problem.

Boynton did not recall consciously thinking about the possibility of sexual abuse in Wendy's family before the words came out on the letter board, but once the dust had cleared, she realized this might have been the source of the idea. Unconsciously, Boynton had provided an explanation for the change in Wendy's behavior. Ironically, given further thought, Boynton realized that Wendy's aggressive behavior was much more likely a sign of resistance to FC. Wendy was telling her that she did not like having her hand held or having Boynton sit so close to her.

"Orange Blooms" (2018) by Janyce Boynton.

The most difficult question was how she could have been fooled by FC. How could she have come to believe that Wendy was the one controlling the typing? After the episode with Wendy was over, Boynton kept in touch with Howard Shane, who gave her copies of published research studies on FC, all of which showed it to be bogus. It was at this point that Boynton recognized an important mistake she made back at the beginning of her FC experience. When she had doubts about FC, rather than look widely for information about it, Boynton had consulted FC advocates and the pro-FC literature. Outside the cult of FC, opinion was very different, but she had not looked for dissenting views. Shane helped her widen her understanding, but there was still the question of how she had been so completely fooled. As another facilitator once said to her, "You mean all this time, I've been talking to myself?"

Wendy's case, as well as other FC-related cases of false sexual abuse allegations, were described in a 1993 PBS *Frontline* documentary "Prisoners of Silence" (Palfreman 1993). In addition, the film showed a similar double-blind test of FC conducted at the O.D. Heck Developmental Center in Schenectady, New York. The staff of the center had come under the sway of FC and were using it extensively throughout the institution. As in Boynton's case, double-blind tests showed that not a single correct response was typed when the facilitator did not know the answer. Furthermore, there were interviews with experienced staff members who, like Boynton, were completely fooled into believing their students were doing the typing. They reported being "devastated" by the results of the test—the same word Howard Shane recently used to describe Boynton's initial reaction to the testing with Wendy.

Ironically, given further thought, Boynton realized that Wendy's aggressive behavior was much more likely a sign of resistance to FC.

So, after seeing the film, Boynton knew she was not alone in her confusion, and she went on to read a number of research articles that showed it was quite easy to create credulous facilitators in a laboratory setting. For example, in a study by Burgess and colleagues (1998), college students were told that FC worked, and they received little training in the technique. Despite this minimal level of exposure, the great majority of students willingly took on the role of facilitator. Eighty percent of them produced correct responses to questions whose answers they knew but that the disabled person they were working with—who, in fact, was a non-disabled actor—did not know. And, yet, these new facilitators expressed the belief that they were not typing the words.

Although it helped to learn about how easily people can be fooled, Boynton continued to feel uneasy about the entire episode with Wendy and her family.

A Personal Journey

Boynton stayed on as a speech pathologist in the same school district for another six years, after which she left to pursue a master's degree in education. She had originally intended to return to teaching, but by the time she completed her master's, she wanted to pursue her art. Over the years, she kept in touch with Howard Shane, who provided her with articles about FC and checked in to see how she was doing. In the meantime, reporters called her on occasion, and although she was reluctant to speak to them, she was often persuaded to do so, knowing that they were likely to write about her whether she spoke to them or not. It seemed better to take the opportunity to describe things in her own words. But this also meant that it was difficult to let her FC experience fade into the past. So, over the years, Boynton began to take a number of active measures to both make amends and do what she could to lessen the harm of FC.

First, she made a sincere and very public apology to Wendy's parents. With the consent of all parties, the apology was filmed for an episode of ABC TV's *20/20*, and although many families might not have been so generous, Wendy's parents graciously accepted her apology.

Quite a few years later, Shane learned that the journal *Evidence-Based Communication Assessment and Intervention* had scheduled a special issue on the topic

of facilitated communication. Knowing that Boynton was still troubled by her experiences with FC, he suggested she write an account of what had happened to her. Writing the article turned out to be a very positive experience. It helped her sort out her thoughts about what had happened from the vantage point of several years of separation, and as part of the peer-review process, she received helpful criticism from professional reviewers. The result was a remarkably frank description of her case that stands as a unique and very valuable contribution to the literature on FC (Boynton 2012).

Finally, in recent years she has gone on to become a leading activist in the effort to end the use of FC. Despite overwhelming evidence discrediting FC that eventually led to at least nineteen professional, governmental, and advocacy groups throughout the world issuing policy statements against its use (Behavior Analysis Association of Michigan 2018), the supporters of FC have come roaring back to defend it. In addition, they have introduced new forms of FC that are just as pseudoscientific but packaged differently, the most prominent of which is called rapid prompting method (Vyse 2016). Like many of those who have followed the FC saga, Boynton was frustrated by its continued—and even growing—popularity. In response, she helped organize a small band of activists and has become their unofficial leader. She maintains a clearinghouse of professional articles and media coverage about FC, as well as a variety of other resources, and she keeps her eye open for opportunities to expose the bogus nature of FC and prevent the many harms it can cause.

Boynton's efforts have already borne fruit. As outlined in a previous column, earlier this year the University of Northern Iowa (UNI) sponsored a "Midwest Summer Institute: Inclusion and Communication," which included instruction in FC. The university also offered college credit for some of the institute's workshops. In collaboration with her crew of advocates, Boynton drafted a letter objecting to the promotion of a discredited and potentially dangerous technique. The letter was signed by thirty academics and professionals and sent to the administration of the university. In addition, the controversy was covered by the local Cedar Rapids newspaper. Eventually, the UNI Provost responded by saying that he would assemble a committee to evaluate their summer workshops (Vyse 2018). In October, the Provost announced that the committee had reached its conclusion and that the university would "no longer be hosting the facilitated communication conference."

Janyce Boynton, who was a victim of FC pseudoscience over twenty years ago, has come full circle from believer to skeptic and from a user of FC to a dedicated advocate for abolishing it.

By removing the University of Northern Iowa's stamp of approval from an FC workshop, a substantial blow was struck against pseudoscience and in favor of reason. But this is just the beginning. There are a number of other universities and governmental organizations that tacitly or explicitly endorse FC and/or its related techniques, and Boynton and her allies have their eyes on a number of these future targets.

Janyce Boynton, who, along with Wendy's family, was a victim of FC pseudoscience over twenty years ago, has come full circle from believer to skeptic and from a user of FC to a dedicated advocate for abolishing it. Her perspective is completely unique. No one else has taken her unusual journey. But she has emerged as an important figure in the cause for science and reason in the field of autism treatment.

Howard Shane has known Boynton since those early days when they were brought together by Wendy's case. Asked to comment on her career, he wrote:

> It is truly courageous, if not inspirational, that Janyce was able to immediately recognize and accept that she had been seduced into the role of facilitator, but has worked tirelessly for decades to make amends for that unconscious, involuntary misstep. As a result, she has quietly assumed a leadership role of a small army of academics and advocates in their unremitting struggle to mitigate the negative effects of FC.

I can think of no one who has had a more unusual path to science advocacy than Janyce Boynton, but the nature of her journey is part of what makes her voice so powerful. This collage artist from Maine speaks with a kind of authority that none of her academic and professional colleagues can match, and what she has chosen to do with her voice is, indeed, courageous and inspirational. ■

Note

1. I have not used the actual names of the student and her family.

References

Behavior Analysis Association of Michigan. 2018. Resolutions and Statements by Scientific, Professional, Medical, Governmental, and Support Organizations Against the Use of Facilitated Communication. Available online at http://www.baam.emich.edu/baam-fc-resolutions-compilation.html.

Boynton, Janyce. 2012. Facilitated communication—what harm it can do: Confessions of a former facilitator. *Evidence-Based Communication Assessment and Intervention* 6(1): 3–13. Available online at https://doi.org/10.1080/17489539.2012.674680.

Burgess, Cheryl A., Irving Kirsch, Howard Shane, et al. 1998. Facilitated communication as an ideomotor response. *Psychological Science* 9(1): 71–74. Available online at https://doi.org/10.1111/1467-9280.00013.

Palfreman, J. 1993. Prisoners of silence (J. Palfreman, Director). In D. Fanning (Executive Producer), *Frontline*. Boston: Public Broadcasting Service. Available online at https://youtu.be/5sO9LyXuOQY.

Vyse, Stuart. 2016. Syracuse, Apple, and autism pseudoscience. CSI Online (April 28). Available online at https://www.csicop.org/specialarticles/show/syracuse_apple_and_autism_pseudoscience; accessed November 12, 2018.

———. 2018. Autism wars: Science strikes back. Skeptical Inquirer 42(6) (November/December). Available online at https://www.csicop.org/specialarticles/show/autism_wars_science_strikes_back; accessed November 12, 2018.

Matthew C. Nisbet is professor of communication at Northeastern University and editor-in-chief of the journal *Environmental Communication*. He also writes at www.wealthofideas.org and can be found on Twitter @MCNisbet.

The Science of Why Yoga Quiets the Mind

Fitness Industry Hype Obscures Yoga's True Benefits

I had been practicing yoga for a decade, but it took an unexplained injury to push me toward turning yoga into a daily routine. I had spent a brutally cold winter battling unexplained nerve pain in my legs, which doctors after a series of diagnostic tests eventually characterized as related to "muscle tension."

For years as a professor and writer, my days were spent at a desk chair, slouched over a computer. I always prided myself on staying in shape, taking breaks to run and lift weights. But now it seemed the years of sitting at a computer, pressed to meet the next deadline, had taken their toll. As I worked with a physical therapist, I began to notice that the nerve pain I felt in my lower legs appeared to be connected to chronic tightness in my hamstrings and hips, and this tightness would intensify after sitting at a desk and/or under conditions of stress.

I switched to a standing desk, which helped considerably, and I quit exercising as intensely as I did when I was twenty-five years old. But it was yoga that seemed to make the most difference. As I recovered, I carefully worked my way back to an hour-long yoga practice. After a few weeks of practicing each morning, I noticed that not only did my nerve pain start to subside, but my posture, sleep, and mood improved. In comparison to any other exercise routine I had previously done, yoga was far more effective at putting my mind and body at ease. Yoga helped me become "non-reactive" to any pain I might be feeling, fending off resulting feelings of anticipation and worry, which by inducing stress would often result in increased pain.

My approach to yoga today is very different from when I first took up the practice. Ten years ago, like many Americans, I approached yoga as just another form of exercise. I recognized the calming effect yoga had on me, but I still began each practice eager to experience an intense workout. But as I have come to understand first hand, ap-

proaching yoga as an intense workout not only risks injury, it also distracts from what researchers are discovering are the true benefits, which include managing mood, controlling our fight or flight stress response, and promoting mental clarity and focus.

It's about the Breath

Even though more than 1,000 studies have been published on yoga, only a handful of high-quality studies exist. A main reason is a comparative lack of U.S. federal funding for health-related yoga research. But based on available evidence that lines up with what we know about the body, the brain, and the nervous system, there are a few things we can at least hypothesize about yoga's health benefits.

As with other forms of exercise, practicing strenuous yoga releases endorphins, which are thought to create not only temporary forms of euphoria but also can help mask pain. Like exercise generally, practicing yoga can lower cortisol, a hormone correlated with stress, depression, and anxiety. By regulating cortisol levels, yoga may also help practitioners produce more melatonin, which can improve sleep and thereby overall mood.

But compared to running, lifting weights, or other forms of exercise, it is yoga's focus on controlled breathing that makes the practice unique, writes *New York Times* science journalist William Broad (2012) in *The Science of Yoga*. The focus on the breath is one reason studies consistently indicate that yoga in comparison to conventional exercise is more effective at managing feelings of stress, depression, and anxiety. Almost all forms of yoga emphasize *Ujjayi pranayama*, a style of slow breathing. When we breathe quickly, which often occurs when we experience stress or anxiety, carbon dioxide levels in our bloodstream decrease while oxygen levels stay the same. The imbalance produced by faster than normal breathing boosts the excitability of our nerves and muscles, producing muscle spasms and tingling in our extremities, which can trigger greater feelings of anxiety.

In contrast, the slow breathing emphasized in yoga practice increases carbon dioxide levels. In response, blood vessels in the brain dilate, sending more oxygen to the brain. By enabling our brains to absorb more oxygen, the slow breathing of yoga increases calmness and alertness, writes Broad. Recent studies point to a second possible way that the effects of yoga may differ from conventional exercise. Yoga appears to uniquely boost levels of gamma-amino butyric acid (GABA). The role of this neurotransmitter is still not fully understood by scientists, but GABA is typically found at lower levels among those experiencing depression, anxiety, post-traumatic stress disorder, and chronic pain. In contrast, higher levels of GABA are correlated with more positive mood and feelings (Streeter et al. 2017).

I switched to a standing desk, which helped considerably, and I quit exercising as intensely as I did when I was twenty-five years old. But it was yoga that seemed to make the most difference.

Moving Fast and Slow

A second way that yoga may be unique from other forms of exercise, writes Broad, is yoga's ability to regulate autonomic features of our nervous system, functions that were once considered beyond our reach to control. Some researchers hypothesize that yoga has the unique ability to either put the brake on our sympathetic system (which generates "fight or flight" stress reactions) or boost our parasympathetic system (which controls our "rest-and-digest" functions).

By cycling through the fast and slow parts of our nervous system, a yoga practice gives our metabolism and nervous system a healthy workout, promoting greater balance. A typical hour-long yoga practice will cycle through braking the sympathetic system and boosting the parasympathetic system. Fast flowing poses stimulate our sympathetic system. More static poses that we hold for a longer period of time or in positions of relaxation put the brake on the "fight or flight" system and promote the "rest and digest" parasympathetic system.

By cycling through the fast and slow parts of our nervous system, a yoga practice gives our metabolism and nervous system a healthy workout. In other words, writes Broad, yoga seems to not only promote the body's flexibility but also our inner flexibility, allowing us to more easily sink into a state of quietude and letting go.

Chasing Perfection

Even as scientists begin to uncover the unique benefits of yoga to mental health and overall well-being, many Americans continue to pursue yoga for the wrong reasons. It is not spirituality or mental harmony that drives their practice but "the pursuit of bodily perfection—the perfect abs, the perfect butt, the perfect backbend," writes journalist John Philp (2009) in *Yoga Inc*. The message of our image-driven culture, Philp observes, is that "yoga is a method that women, mostly, can use to attain physical perfection."

Studies consistently show that people who regularly exercise, as much as they may not admit, tend to care most about appearances. "People exercise not for the physiological benefits," writes University of Alberta's Timothy Caulfield (2012) in *The Cure for Everything*, "but for weight control and looks." There are variations in goals by age and by the health of an individual, "but looks and weight control (for the purpose of looks) are themes in almost every study," notes Caulfield.

Yoga is no different. More than 70 percent of yoga practitioners in the United States are women, according to a 2016 IPSOS survey commissioned by *Yoga Journal* magazine. Among those polled, one in five said that "losing weight" was a motivation for beginning yoga, though the true proportion is likely higher given that 50 percent of practitioners also cited "getting in shape" as a primary goal.

But as a form of exercise, yoga is not a very efficient means to lose weight. The reason, as Caulfield explains, is that our bodies are eating machines. If you want to lose weight, you have to burn more calories than you eat. If, as a 175-pound man, I practiced intense vinyasa or power yoga for sixty minutes, I might burn 350–700 calories. If I followed that by drinking a medium-sized smoothie and eating a modest salad, I would immediately consume as much if not more calories than I just burned.

For the rest of the day, writes Caulfield, I must then eat fewer calories than my body needs, or I will not lose an ounce. There's another paradox: Intense yoga, like other forms of exercise, also tends to increase our appetites. Our bodies are calibrated to stay at whatever weight we might be at the present moment. If you burn off more calories doing yoga than you consume, your body will send strong signals of hunger and craving, compelling you to try to make up the difference, unless you have the willpower to resist.

By regulating cortisol levels, yoga may also help practitioners produce more melatonin, which can improve sleep and thereby overall mood.

Many magazines and advertisements featuring ultra-lean women practicing yoga, combined with the competitive culture of fitness clubs and studios, can also breed unhealthy obsessions. In *Yoga Inc.*, for example, Philp notes studies showing a link between an extreme commitment to yoga and eating disorders, given the emphasis by some teachers on the need to practice on an empty stomach and to follow a strict diet. Rather than a calorie-burning workout, yoga's true benefits to weight loss relate to mind-body balance. If, as reviewed earlier, because of yoga an individual experiences less stress and anxiety and improved sleep, then they are less likely to overeat or seek out high-calorie carbs and sugary foods.

Risky Business

In terms of staying active, yoga's promotion of flexibility and joint mobility may also help ward off injury. But if taken to the extreme, yoga can also cause injury. Between 2001 and 2014, there were more than 29,000 yoga-related injuries in the United States, according to a study by University of Alabama researchers who analyzed data compiled from hospitals by the Consumer Product Safety Commission. During that period, as yoga grew in popularity across age groups, there was a doubling in the injury rate among those aged forty-five to sixty-four (Swain and McGin 2016).

In *The Science of Yoga*, Broad warns that a few popular yoga positions in rare instances may lead to severe injuries. These positions include shoulder stand, plow, wheel, and head stand, which could cause stroke or spinal and arterial injuries. Given the risk, Broad concludes that these poses add little to a practice and should be avoided.

Particularly risky may also be "hot yoga," a vigorous practice performed in a studio heated to above ninety degrees. Philp interviewed medical experts who offered a variety of warnings about the practice. Packed into sweltering hot studios that in contrast to other yoga traditions are often lined with mirrors, we are likely to draw comparisons to others as to how far we should be stretching or what poses we should be perfecting.

Under conditions of intense heat, in competition with others we see in the mirrors, and fueled by endorphins, it is easy to stretch our muscles too far, weakening or tearing them. A common claim also is that hot yoga, by inducing buckets of sweat, cleanses the body of toxins. If you experience nausea or a headache, it is because the toxins are leaving the body. This is dangerous, pseudoscientific nonsense. The most likely trigger of nausea and a headache is dehydration, which requires immediate replacement of fluids.

Practicing Non-Doing

As I recovered from my leg pain and adopted a daily yoga routine, I practiced a slow yet vigorous form of vinyasa yoga on my own at home or outside, visiting a studio once or twice a week. Instead of a workout, my central focus was on my breath and body positioning. In doing so, I came to approach yoga as strenuous meditation-in-motion, adopting the Taoist concept of "non-doing" and "non-forcing." During yoga, I let go of the relentless striving that rules contemporary life. I am not trying to get anywhere, or to achieve anything, but to just *be*.

I came to this view after reading Jon Kabat-Zinn's (2009) classic *Full Catastrophe Living*, his comprehensive guide to the Mindful-Based Stress Reduction program he pioneered over several decades. In the program, participants after several weeks of regular meditation move to a slow yoga practice. Yoga should be done without forcing or striving, "accepting our body, as we find it in the present, from one moment to the next," Kabat-Zinn writes. "While stretching, lifting, or balancing, we learn to work with and dwell at our limits while maintaining moment-to-moment awareness." From this approach we may create an "island of being in the sea of constant doing in which our lives are usually immersed, a time in which we allow all the doing to stop" (Kabat-Zinn 2009). ■

References

Broad, W.J. 2012. *The Science of Yoga: The Risks and the Rewards*. New York: Simon and Schuster.

Caulfield, T.A. 2012. *The Cure for Everything: Untangling Twisted Messages about Health, Fitness, and Happiness*. Boston, MA: Beacon Press.

Kabat-Zinn, J. 2009. *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*. New York: Delta.

Philp, J. 2009. *Yoga, Inc.: A Journey through the Big Business of Yoga*. New York: Penguin Global.

Streeter, C.C., P.L. Gerbarg, T.H. Whitfield, et al. 2017. Treatment of major depressive disorder with Iyengar yoga and coherent breathing: A randomized controlled dosing study. *The Journal of Alternative and Complementary Medicine* 23(3): 201–207.

Swain, T.A., and G. McGwin. 2016. Yoga-related injuries in the United States from 2001 to 2014. *Orthopaedic Journal of Sports Medicine* 4(11).

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of several books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Bailing in the Mummies

Q: Today I heard a speaker repeat the story that mummies were used as fuel in British trains. I recall this was a classic legend first related by Mark Twain in *The Innocents Abroad*, but the speaker insisted that she thoroughly researched the subject, and it was true. Got anything on this?

—B. Dail

A: This bit of morbid historical curiosa, suitably limned with anti-colonial themes, has been around for over a century and reported as true by a handful of writers. *Discover* magazine writer LeeAundra Temescu wrote in 2006 that "During a railway expansion in Egypt in the nineteenth century, construction companies unearthed so many mummies that they used them as locomotive fuel." This factoid inspired poet Charles Webb to write a piece titled "Mummies to Burn" for *Slate* in January 2010[1].

There is no evidence at all that mummies were burned in locomotives, and Dail correctly identified the origin of the myth. Cecil Adams of *The Straight Dope* received a similar query in 2002 and replied, in part, "What you heard was a mangled version of a classic joke told by one of the masters of the art. But don't feel bad—people have been falling for this one for more than 130 years." Some people, apparently unaware of Twain's penchant for humor and hyperbole, took his comment literally or as "reporting." For example, Joann Fletcher (2011), an honorary research fellow at the University of York and part of York's Mummy Research Group, in an article for no less an authoritative source than the BBC, wrote that "Even less fortunate were those mummies exported to the U.S. for use in the papermaking industry or even, as Mark Twain reported, to be burnt as railroad fuel."

There is no evidence at all that mummies were burned in locomotives, and reader Dail correctly identified the origin of the myth.

Celestia Ward, Two Heads Studios

So let's consult the source: in Twain's *The Innocents Abroad*, chapter 58, he writes, in part:

> I shall not tell of the Great Caravan which leaves for Mecca every year, for I did not see it; nor of the fashion the people have of prostrating themselves and so forming a long human pavement to be ridden over by the chief of the expedition on its return, to the end that their salvation may be thus secured, for I did not see that either; I shall not speak of the railway, for it is like any other railway—I shall only say that the fuel they use for the locomotive is composed of mummies three thousand years old, purchased by the ton or by the graveyard for that purpose, and that sometimes one hears the profane engineer call out pettishly, "D--n these plebeians, they don't burn worth a cent—pass out a King;"—(Stated to me for a fact. I only tell it as I got it. I am willing to believe it. I can believe anything.)

I include the preamble for context—though no excuse is needed to quote Twain at any length—and not only is the comment explicitly made in the context of other absurd claims ("a long human pavement to be ridden over" by exalted leaders would surely be a needlessly bumpy ride), but Twain goes out of his way to say that if he (and by extension his readers) will believe that, they'll "believe anything." It seems he was right. From competitive jumping frogs to Tom Sawyer's adventures, it's hard to fathom how, of any English-language author, Twain's works would not be recognized as satirical and greatly embellished.

It's not uncommon for people to mistakenly repeat myths and misinformation; we all hear and share information that we haven't personally vetted.

It's certainly true that in the 1800s Egyptian mummies were both plentiful and often displayed with little respect for the dead in sideshows and museums. But the idea that they were burned for fuel (or "bailed into" the locomotive furnace) is another matter. Most sources I found debunk and discredit the story (including *Mummies: Truth and Rumors* by Heather Montgomery), but probably the most definitive appears in the book *The Mummy Congress: Science, Obsession, and the Everlasting Dead*, by Heather Pringle (2001, Penguin Books). On pages 189 and 190 she explains, "So striking was this brief sketch that Twain's tale has lodged itself firmly in mummy lore. No mummy

Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON
DIGITAL EDITION
GET IT ON Google play
Available on the App Store
Skeptical Inquirer
THE MYTHS OF ENDLESS ENERGY
COLD FUSION THIRTY YEARS ON THE ENERGY CATALYZER HOAX
The Sputtering Engine of Creator Belief
Cancer Screenings: Problems and Pitfalls

expert has ever been able to authenticate the story, however, although several have tried and written about their frustration. Twain seems to be the only published source—and a rather suspect one at that."

Pringle notes that it's only one of several legends about mummies of that era, including that in the 1850s as demand for paper grew in America, mummies were imported and their ancient linen used to help manufacture brown wrapping paper for household use (York University's Joann Fletcher mentions this). This "mummy paper" was discontinued when it was discovered that diseases had leached from the Egyptian bodies and into the wrapping paper.

> In the mid-1990s, Joseph Dane, an America English professor, went hunting for proof that mills had ever recycled mummy wrappings. He was unable to recover a single shred. He came across no conclusive records of the trade or even a single example of the paper—surprising given how novel these sheets would have seemed at the time. (Pringle 2001, 191)

It's not uncommon for people to mistakenly repeat myths and misinformation; we all hear and share information that we haven't personally vetted. I'm more concerned about the "expert" who repeated this myth to Dail and her audience; if she really did "thoroughly research the subject" as she claimed, it raises serious questions about her researching skills. It is one thing to present a piece of information with a caveat such as "some say" or "attributed to," but quite another to positively affirm an inherently suspect or dubious claim by personally endorsing it.

This example shows why diligent research involves consulting a variety of sources; at least three and ideally five or more.

This example shows why diligent research involves consulting a variety of sources; at least three and ideally five or more. If you just do an internet search and glance at the top result to see if any writers or experts have reached the same conclusion you have, you may likely find confirming information. But if you spend a few minutes to do a less superficial search, you're more likely to discover if the idea is widely accepted or has been thoroughly debunked. Besides, everyone knows that kings make better human pavement than peasants. ■

Note

1. The error was pointed out to the magazine's editors, who later added a note at the bottom of the online version acknowledging that "this was probably a hoax." The fact that the misinformation was cited as true four years later by *Slate* poet Charles Webb suggests that the correction has gone largely unnoticed.

References

Fletcher, Joann. 2011. Mummies around the world. BBC News (February 17). Available online at http://www.bbc.co.uk/history/ancient/egyptians/mummies_01.shtml.

Pringle, Heather. 2001. *The Mummy Congress: Science, Obsession, and the Everlasting Dead*. New York: Penguin Books.

Temescu, LeeAundra. 2006. 20 things you didn't know about ... death. *Discover* (September). Available online at http://discovermagazine.com/2006/sep/10-20thingsdeath.

Twain, Mark. 1869. The innocents abroad. In *The Unabridged Mark Twain* (1976). Lawrence Teacher, Ed. Philadelphia, Pennsylvania: Running Press.

There's much more available on our website!

Skeptical Inquirer

Here's just a sample of what you'll find online at csicop.org:

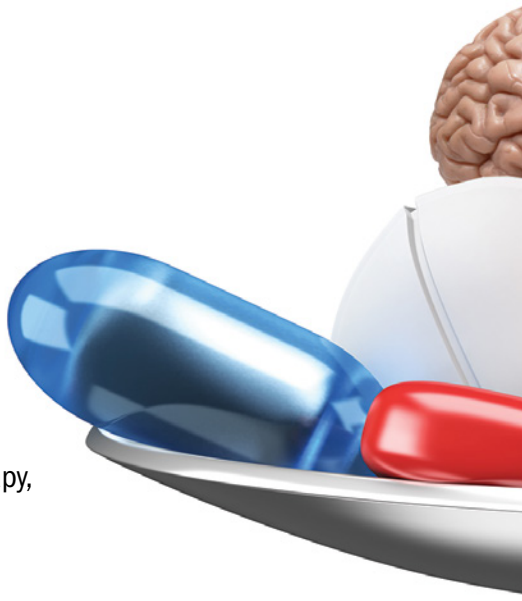
A Closer Look at the Bela Lugosi "Haunted" Mirror

For his "A Closer Look" online article, Kenny Biddle investigates the history behind one of four marquee "cursed items" on display at a Haunted Museum tourist attraction run by TV ghost hunter Zak Bagans: the Bela Lugosi cursed mirror. Bagans tells a terrifying tale of its ghastly origins and supernatural powers—but is it true? Biddle is on the case and debunking is not far behind!

Natalie Grams: Medical Homeopath to Professional Skeptic

In her CSI Special Report, Annika Merkelbach interviews Natalie Grams, a German woman who for years worked as a professional homeopath and was so strongly convinced of the efficacy and validity of homeopathy that she decided to write a book about it. In the process of researching it—and being exposed to skeptical critiques—she changed her mind. Grams notes: "Since then I have been more and more skeptical about homeopathy, doing further research, where engaging in many debates and dialogues with skeptics and scientists, strengthened my conviction and my knowledge. Afterward, I also really became a 'skeptic by profession.'"

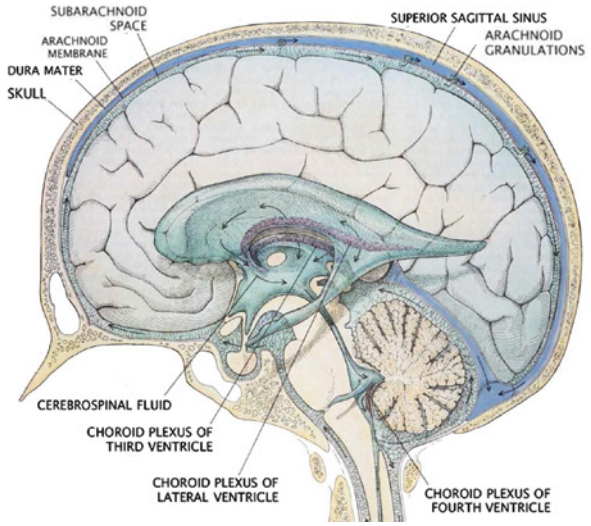
ANTIOXIDANT MEGAVITAMINS FOR BRAIN HEALTH: PUFFERY VS. FACT



Billions of dollars are spent on worthless and even harmful megavitamin therapy, especially with vitamins C and E. How did the craze for megavitamins and multivitamins come about, and why does it continue?

REYNOLD SPECTOR

Many worthless medical products and procedures are widely marketed and sold, some falling under the alternative medicine label. Two examples I am intimately familiar with are the irrational use of megavitamins C and E. In humans, the two are the principal exogenous antioxidants, and they are essential for body and brain health. Antioxidant vitamins C and E are particularly important in the brain because neurons that are damaged and die by uncontrolled oxidation cannot be replaced in the adult human brain, i.e., there is no neurogenesis after about age seven (Arellano et al. 2018).



Credit: Carol Donner

CHOROID PLEXUS sits within the fluid-filled chambers in the brain called ventricles. It continuously secretes cerebrospinal fluid (CSF), which cushions the nervous system, carries some nutrients to brain tissues, and cleanses the brain of wastes. As new CSF is produced, old CSF is forced to flow through the ventricles, around the spinal cord, and into the subarachnoid space around the brain.

Other exogenous antioxidants in foods or supplements generally do not enter the human brain and cannot substitute for vitamins C and E. After careful analysis of the data, public health authorities have published recommended daily allowances (RDAs) for vitamins. For vitamin C, the RDA is 60 mg daily (up to 140 mg for smokers); for vitamin E, 30 international units of α-tocopherol (vitamin E) daily. However, in the 1970s, the double Nobel laureate Linus Pauling recommended megavitamin C therapy (greater than ten times the RDA) for those who suffer from some brain diseases, including schizophrenia; he also suggested that megavitamin C could make one "think better." We now know that these recommendations are incorrect. In 1977, I explained to Professor Pauling in person and published correspondence (Pauling and Spector 1977) why his theories were incorrect. Even more distressing, decades later, professorial recommendations from some prestigious university faculties (e.g., Willet 2003) recommended daily doses of vitamin C of 200 to 300 mg; Willet also suggested that daily megavitamin E was safe and might prevent cardiovascular disease, including stroke (Willet 2003). Even in 2002, we knew that was bad advice (Spector and Vesell 2002). Yet to this day, billions of dollars have been spent on worthless or even harmful megavitamin therapy. Moreover, it is also clear that daily RDA multivitamins in most Americans are unnecessary for body and brain health (Haslam and Prasad 2018). Yet again, billions have been spent on multivitamins. How did the persistent "craze" for megavitamins and multivitamins come about and why does it continue? Is this fixation just a waste of money or does it have harmful effects? These are issues I will explore

focusing on brain health. There is a grain of truth in multivitamin and megavitamin therapy in rare clinical situations, as discussed below.

To understand the issues relevant to brain health, let's review briefly brain development and then the physiology, biochemistry, and molecular biology of these two vitamins. For vitamin C (also known as ascorbic acid), approximately three centuries ago the British Navy found lemons and limes would prevent scurvy (Brown 2003). Interestingly, in severe scurvy, even as the patient (typically a sailor) was dying, his brain function was still intact. In 1933, Szent-Gyorgyi isolated vitamin C, for which he won a Nobel Prize (Brown 2003). We now know vitamin C is deficient in scurvy. Since then, multiple investigators have studied vitamin C in animal and human brains. One problem solved was how vitamin C enters the brain from blood because water-soluble compounds such as vitamin C cannot penetrate through the blood-brain or blood-cerebrospinal fluid (CSF) barriers by simple diffusion (Spector and Johanson 2006). These anatomical barriers protect the brain from many toxic substances in the blood, including certain drugs. It turns out that vitamin C enters the brain by a back door route; specifically, it is "pumped" by a small brain organ, the choroid plexus (CP), from blood into CSF. The choroid plexus is a component of the blood-CSF barrier (Spector and Johanson 2006). The specific vitamin C transporter is termed the sodium-dependent vitamin C transporter 2 (Svitamin CT2) (Spector and Johanson 2006). This transporter vigorously pumps vitamin C into the cerebrospinal fluid to replace the vitamin C lost in the constant turnover of the CSF. From the CSF, vitamin C then diffuses into the brain on the other side of the barriers; vitamin C is then pumped into neurons by Svitamin CT2 in neurons. These systems are configured in such a way as to keep the high concentration of vitamin C in neurons relatively constant (homeostasis). These processes begin early in the development of the brain and are crucial for brain development (Silva-Alvarez et al. 2017; He et al. 2015). In fact, in animals, manipulation of vitamin C fetal brain concentrations during brain development (either too high or too low) leads to abnormal brain development (He et al. 2015). Moreover, lack of Svitamin CT2 is incompatible with life (Spector and Johanson 2006). For pictures of these processes see Spector and Johnson (1989).

THERE ARE MULTIPLE REASONS TO ESCHEW ANTIOXIDANT MEGAVITAMIN USE. FIRST, THE RATIONALE FOR THEIR USE IS NOT SOUND; ORAL MEGAVITAMINS C AND E DO NOT INCREASE BRAIN VITAMIN C OR E MUCH IF AT ALL.

Vitamin C has three functions in the brain. It is necessary:

1) as a cofactor for several enzymes, e.g., those that make dopamine and norepinephrine;
2) as a crucial antioxidant (as is vitamin E). In the brain, vitamin C in its protective role is oxidized, but in a complex process it is then generally reduced back to vitamin C so it can be reutilized (Nualart et al. 2014).
3) as a molecule critical for the development of certain neuronal subpopulations, e.g., dopamine neurons in a part of the brain called the substantia nigra; when too many nigra neurons die off, patients develop Parkinson's disease (He et al. 2015). This recently described (epigenetic) process is astounding in its complexity.

As with vitamin C, it is very difficult to deplete the brain of vitamin E. Moreover, in humans, in a study in which the daily dose of vitamin E was raised more than 100 times the RDA, there was no significant increase in the CSF concentration of vitamin E (again, profoundly effective homeostasis) (Spector and Johanson 2007). However, there is a syndrome called ataxia associated with vitamin E deficiency (Avitamin ED) due to a genetic lack of α-tocopherol transport protein (αTTP). The Avitamin ED syndrome attests to the importance of both the αTTP and vitamin E in brain function. In humans, megavitamin E is helpful in this very rare syndrome (Spector and Johanson 2007).

After Pauling's incorrect recommendations for megavitamin C for brain health, there was continued interest in vitamin therapy, in part because of the great successes in understanding and overcoming deficiency states. An excellent example is pellagra, which affected millions of people in the southern United States around the turn of the twentieth century. These patients who consumed a niacin-deficient diet suffered from dementia, dermatitis, and diarrhea. Like magic, when sufficient niacin (or the amino acid tryptophan, which can be converted in the body to niacin) was included in the diet, pellagra disappeared—a triumph of nutrition research and chemistry.

Over time, gradually other vitamin dietary deficiency syndromes were uncovered, understood, and effectively combated, including thiamine, folate, B-12, and many others. These were also great triumphs of nutrition research and chemistry. However, after a series of epidemiology/observation (big data) studies were published by investigators from prestigious universities in the best journals (e.g., the *New England Journal of Medicine*), claims were made that vitamin E prevented cardiovascular disease, including stroke (Spector and Vesell 2002; Willet 2003; Patel et al. 2015). After their publication, these claims provoked an explosion of interest in megavitamin E. In retrospect, these studies suffered from bias and/or confounding, misuse of statistics, poor validation of the measurement instruments, cherry picking, and other nonscientific problems (see Table 1; Spector and Vesell 2002; Patel et al. 2015). Years later in the early 2000s, multiple randomized, placebo-controlled, double-blind trials were published that showed that megavitamin E was not superior to placebo and even suggested megavitamin E might increase deaths (Spector and Vesell 2002). Despite these results, Walter Willet suggested megavitamin E was safe and might be helpful (Willet 2003); he would not accept that the causal conclusions from his epidemiology-observation studies were incorrect.

Indeed, epidemiology/observation (big data) studies have a checkered history, including corrupt practices as described in a well-documented recent report (Kearns et al. 2016). The fact that such epidemiology/observa-

TABLE 1

Reasons for Erroneous Conclusions

(Patel et al. 2015; Hill 1965)

1) Bias
2) Confounding (false assignment of a cause)
3) Cherry picking
4) Misuse of statistics
5) Context
6) Improper generalization of results
7) Multiple comparisons not taken into account
8) Post-hoc analyses
9) Association does not prove causation

TABLE 2

Reasons for Popularity of Worthless Therapies, including Megavitamins/Multivitamins

1) Placebo effect
2) Erroneous studies (see text)
3) Incorrect authoritarian advice (see text)
4) Dissatisfaction with conventional therapy
5) Habit (once started, it is hard to stop)
6) "More the merrier"
7) Prevention of deficiency
8) Demand to "do something"
9) Advertising, often misleading or false
10) Corruption

tion studies were and still are published in premier journals was and remains a scientific scandal (Hill 1965; Patel et al. 2015). To be able to conclude that an association found in such studies implies causation requires satisfaction of the Hill criteria (Spector and Vesell 2002; Hill 1965), which are almost never met in published epidemiology/observation studies.

Recently Chirag Patel and colleagues (2015) quantitatively discussed the epidemiology/observation trials of vitamin E and showed that, depending on how one analyzed the data, you could obtain *any* answer, from higher to lower risk of mortality. These analyses show the danger of conclusions from "big data," unlike those from randomized, blinded controlled trials with an up-front hypothesis and a data-analysis plan outlined in advance.

Thus, there are multiple reasons to eschew antioxidant megavitamin use. First, the rationale for their use is not sound; oral megavitamins C and E do not increase brain vitamin C or E much if at all. Second, and more important, the gold standard of controlled randomized, blinded trials disconfirmed their general utility. Billions of dollars are wasted by consumers, but worse, megavitamin therapy is not without side effects (Willet 2003) and may delay patients from receiving effective medical care. Of course, the sellers (from the manufacturers to the retail outlets) benefit.

Why, then, does the use of antioxidant megavitamins persist and in some places actually increase? Table 2 notes several reasons, as suggested in the extant literature. Some of these "causes" are surprisingly very powerful motivators (including the placebo effect and habit).

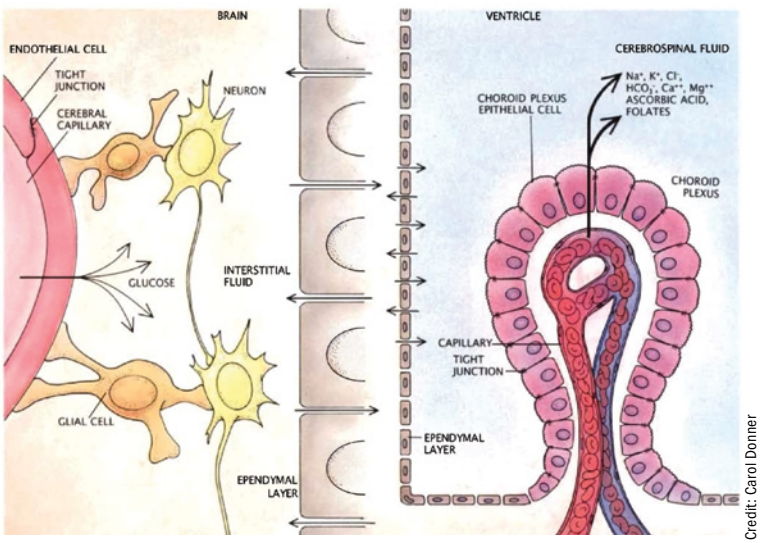
AFTER PAULING'S INCORRECT RECOMMENDATIONS FOR MEGAVITAMIN C FOR BRAIN HEALTH, THERE WAS CONTINUED INTEREST IN VITAMIN THERAPY, IN PART BECAUSE OF THE GREAT SUCCESSES IN UNDERSTANDING AND OVERCOMING DEFICIENCY STATES.

However, there are a few noteworthy exceptions where specific megavitamins and/or multivitamins are clearly useful and sometimes crucial (Table 3). First and obviously, patients with abnormal GI tracts and those who take certain drugs may not absorb vitamins properly and often require higher doses to prevent vitamin deficiency states. Some elderly otherwise healthy persons may also require higher doses of certain vitamins (e.g., B-12 and vitamin D) because of poor GI absorption. Pregnant women, especially those with hyperemesis gravidarum, often require vitamin B-6, folate, and multivitamins. There are also a small number of patients with defective transporters of specific vitamins into blood or the brain who benefit from one specific vitamin. Over the past forty-odd years, specific defects in separate brain transporters of thiamine, riboflavin, and folates have been discovered (Spector 2014). Without the specific vitamin given as megavitamin therapy, these patients develop severe neurological disorders or die. The unraveling of the molecular cause and treatment of these rare disorders is a triumph of pediatric neurology (Spector 2014). There are also infants and children who present with seizures who respond to large doses of vitamin B-6. There are at least six different brain enzyme disorders and one body disorder, all defined at a molecular level, as well as other ill-defined syndromes that respond with cessation of seizures to vita-

TABLE 3

Examples of Conditions for Which Megavitamin Therapy May Be Indicated

1) Malabsorption syndromes
2) Use of proton pump inhibitors and other drugs
3) Genetic defects in transporters/enzymes
4) Elderly
5) Pregnant women (multivitamin)
6) Rare utilization of the "placebo effect"



Credit: Carol Donner

ESSENTIAL NUTRIENTS reach the neurons and glial cells in the brain by crossing either the blood CSF barrier, which is regulated by the choroid plexus, or the blood-brain barrier of the cerebral capillaries. Water soluble molecules cannot diffuse freely between the blood and the CSF because of impermeable tight junction seals between the choroid epithelial cells; instead the epithelial cells transfer certain molecules from one side of the barrier to the other.

min B-6 (Spector and Johanson 2007). Finally, there is the use of vitamin "therapy" by sophisticated physicians for the placebo effect. This is often done in patients with vague complaints in which no cause can be found. The ethics and utility of this practice (e.g., unnecessary B-12 injections) are discussed at length in my textbook (Spector 1985).

In summary, there is no scientific basis for megavitamins (or for that matter, multivitamin use) in general in the U.S. population (Haslam and Prasad 2018). Vitamins are omnipresent in the diet, and many foods are fortified with vitamins. Even patients in whom vitamin deficiency might be expected (e.g., dementia patients with Alzheimer's disease) when studied carefully are not generally deficient (Spector and Johanson 2013). There are, as noted in Table 3, exceptions that generally must be handled on a case by case basis; when an abnormality is found, the appropriate vitamin or vitamins must be given. Giving massive doses of vitamin C or E will not help those who need riboflavin or thiamine or B-6 or nothing!

THE FACT THAT SUCH EPIDEMIOLOGY/OBSERVATION STUDIES WERE AND STILL ARE PUBLISHED IN PREMIER JOURNALS WAS AND REMAINS A SCIENTIFIC SCANDAL.

In a free country it is not clear how to stop unwise and wasteful practices. There are many such practices in the health field (e.g., acupuncture, homeopathy, and megavitamins), practices that in many American localities continue to expand. It is true there are not "big" or in some cases any health risks in the use of multivitamin and megavitamin therapy, homeopathy, and acupuncture. Consequently, it is very hard to stop their use (Table 2). Thus, the big question (paraphrasing Lenin) is: What is to be done *now*? ■

Acknowledgement

I thank Michiko Spector for her many valuable points and her aid in preparing the manuscript.

References

Arellano, J., B. Harding, and J.L. Thomas. 2018. Adult human hippocampus: No new neurons in sight. *Cerebral Cortex* doi: 10.1093/cercor/bhy106.

Brown, S.R. 2003. *Scurvy—How a Surgeon, a Mariner, and a Gentleman Solved the Greatest Medical Mystery of the Age of Sail*. New York: Thomas Dunn Books.

Haslam, A., and V. Prasad. 2018. Multivitamins do not reduce cardiovascular disease and mortality and should not be taken for this purpose—how do we know that? *Circ Cardiovasc Qual Outcomes* 11: e004886. Doi: 10.1161/CIRCOUTCOMES.118.004886.

He, X-B, M. Kim, S-Y Kim, et al. 2015. Vitamin C facilitates dopamine neuron differentiation in fetal midbrain through TET1- and JMJD3-dependent epigenetic control manner. *Stem Cell* 33: 1320–1332.

Hill, A.B. 1965. The environment and disease: Association or causation. *Proceedings of the Royal Society of Medicine* 58: 295–301.

Kearns, C.E., L.A. Schmidt, and S.A. Glantz. 2016. Sugar industry and coronary heart disease research—a historical analysis of internal industry documents. *JAMA Internal Medicine* 176(11): 1680–1685.

Nualart, F., L. Mack, A. Garcia, et al. 2014. Vitamin C transporters, recycling and the bystander effect in the nervous system: Svitamin CT2 versus gluts. *Journal of Stem Cell Research Therapy* 4(5): 209; doi: 10.4172/2157-7633.1000209.

Pauling, L., and R. Spector. 1977. Vitamin homeostasis in the brain and megavitamin therapy. *New England Journal of Medicine* 297(14): 790–791.

Patel, C.J., B. Burford, and J.P.A. Ioannidis. 2015. Assessment of vibration of effects due to model specification can demonstrate the instability of observational associations. *Journal of Clinical Epidemiology* 68: 1046–1058.

Silva-Álvarez, C., K. Salazar, P. Cisternas, et al. 2017. Apical polarization of Svitamin CT2 in apical radial glial cells and progenitors during brain development. *Molecular Neurobiology* 54: 5449–5467; doi 10.1007/s12035-016-0081-2.

Spector, R. 1985. *The Scientific Basis of Clinical Pharmacology: Principles and Examples*. Boston, MA: Little Brown and Co.

———. 2014. Vitamin transport diseases of brain: Focus on folates, thiamine and riboflavin. *Brain Disorder Therapy* 3: 2; doi org/10.4172/2168-975x.1000120.

Spector, R., and C.E. Johanson. 1989. Mammalian choroid plexus: Structure, development and function. *Scientific American* (November): 68–74.

———. 2006. Micronutrient and urate transport in choroid plexus and kidney: Implications for drug therapy. *Pharmaceutical Research* 23(11): 2515–2524.

———. 2007. Vitamin transport and homeostasis in mammalian brain: Focus on vitamins B and E. *Journal of Neurochemistry* 103: 425–438.

———. 2013. Sustained choroid plexus function in human elderly and Alzheimer's disease patients. *Fluids and Barriers of the CNS* 10(28): 1–5.

Spector, R., and E.S. Vesell. 2002. Which studies of therapy merit credence? Vitamin E and estrogen therapy as cautionary examples. *Journal of Clinical Pharmacology* 42: 1–8.

Willett, W.C. 2003. *Eat, Drink and Be Healthy—the Harvard Medical School Guide to Healthy Eating*. New York: Free Press.

Reynold Spector, MD, is adjunct professor of medicine, Rutgers Robert Wood Johnson Medical School. His research areas have included vitamin transport in the brain. He is author of the textbook *The Scientific Basis of Clinical Pharmacology*.

Respectful Skepticism

Being respectful isn't just a nice thing to do. Skeptics are more likely to succeed if they defend science and reason in a consistently respectful manner.

CRAIG A. FOSTER

The 2018 Committee for Skeptical Inquiry (CSI) CSICon conference is in the books. After checking in at Las Vegas's McCarran International Airport and consuming a mediocre breakfast burrito, I found myself next to Burger King with enough solitude and caffeine-based stimulation to process everything I learned. I have been to three consecutive CSICons; this one placed a stronger emphasis on treating others with respect.

I was part of it. In my talk, I discouraged stereotyping pseudoscience supporters as being unintelligent or mentally unwell. The speakers who preceded me discussed leading with caring and having sympathy toward those who insert Goop into their … lives. Massimo Pigliucci discussed the limits of science (Boudry and Pigliucci 2017). Paul Offit shared a longstanding wish that he could relive a previous event and express more caring. The amazing James Randi himself continued the theme. SI Editor Kendrick Frazier recalled a person who asked Randi about helping loved ones who believe in flim-flam. Randi's advice was to be kind to them, because they have trouble understanding how they have been misled.

Unfortunately, people simply do not recognize the importance of behaving respectfully and then change their *modus operandi* for interacting with others. The challenges associated with creating more respectful behavior are evident at my institution, the United States Air Force Academy. Some might think it odd that an institution would care about respect when its graduates might be asked to kill people. On the contrary, the U.S. Air Force Academy cares a great deal about respect, recognizing that it can reduce unnecessary harm, facilitate a positive workplace climate, and contribute to more effective leadership. I am pleased to say that my department, the Department of Behavioral Sciences and Leadership, has played an influential role in this process, allowing me to learn from discussions surrounding this issue. Treating people with respect is also a thread that perceptibly and imperceptibly weaves through the behavioral science courses we teach.

I would therefore like to take this opportunity to describe why the skeptical community might benefit from behaving more respectfully and to offer some principles that might encourage this type of behavior. Psychologist Ray Hyman, an original member of the Committee for Skeptical Inquiry's Executive Council, similarly encouraged skeptics to behave respectfully in his insightful guide about effective forms of criticism, "Proper Criticism" (Hyman 2001). CSI and the Skeptical Inquirer have been guided by it for decades, since well before they published it. In particular, Hyman argued that more charitable behavior on behalf of skeptics could advance skepticism generally. Building off his work, I will dive more deeply into the concept of interpersonal respect. I use the term *respectful skepticism* so skeptics can consider it as a distinct concept worthy of consideration.

Simply telling people to be more respectful is unlikely to create any profound changes in behavior. Humans typically believe that they behave respectfully enough.

Respectful Skepticism

Simply telling people to be more respectful is unlikely to create any profound changes in behavior. Humans typically believe that they behave respectfully enough. They might believe that the people they disrespect deserve it. They might also misperceive their disrespectful behavior as "tough love" or "setting high standards." These issues are admittedly tricky, but the fuzzy nature of a term such as *respect* should serve as a warning. It would be easy for any community to congratulate itself for caring about

respect without really making any improvements. To get beyond superficial considerations, I start with a definition: *Respectful skepticism is arguing on behalf of skepticism in a constructive and mature manner that appreciates the value of others and avoids unnecessary harm*.

Skeptics should consider developing a more respectful approach, not just because it might feel good but also because it will help skeptics create a less unreasonable world. Behaving more respectfully should make skeptics appear more likable and credible, both of which are crucial when attempting to influence others (Cialdini 2001; Hyman 2001). Humans are motivated toward cognitive consistency (Gawronski and Strack 2012), so it is easy for people to listen to likeable skeptics and disregard unlikable ones. Furthermore, it is understandably difficult for people to come around to agreeing with a community that has already chided them. Disrespectful behavior can also contribute to a negative stereotype about skeptics, regardless of whether that perception is fair (Hilton and von Hippel 1996; Hyman 2001). Thus, skeptics who behave disrespectfully can undermine skepticism broadly, particularly when they are communicating in a context that associates their behavior with the skeptical community.

Describing any behavior as universally respectful or disrespectful is probably an impossible task. Thus, respectful skepticism is best considered as a goal—an intention to treat others, even skepticism's adversaries, with decency. To help skeptics (myself included) better achieve this goal, I offer five principles that skeptics might consider and practice.

Once beliefs are formed, humans are slow to change them. They tend to interpret incoming information in a confirmatory manner.

1. Free Will and Determinism

Recognize that individuals have rich personal histories that shape how they think, feel, and behave. Philosophers have debated for millennia about whether humans exert any type of free will (Dennett 2013). I do not think it is useful to get caught up in the minutiae of this interesting debate, but suffice it to say that if humans have free will, it appears to be limited. Social science research demonstrates that humans do not independently choose their respective beliefs; beliefs are shaped by biological, cognitive, and sociocultural factors. Genetics predict beliefs. Obviously individuals do not possess specific "belief genes," but heredity causes general characteristics that make people more likely to believe one claim over another (e.g., Loehlin 1993). Environmental forces are also influential. Cultural and sociological factors (e.g., religious or nonreligious affiliations) shape belief development (Bauer et al. 2012). More specific relationships, such as those formed with parents and peer networks, are similarly influential (Glass et al. 1986; Visser and Mirabile 2004).

Once beliefs are formed, humans are slow to change them. They tend to interpret incoming information in a confirmatory manner (Nickerson 1998). They are more likely to communicate with people who have similar beliefs, and they usually overestimate the number of other people who support their views (Goel et al. 2010). It is also difficult for individuals to recognize when their beliefs are "paranormal" or "pseudoscientific" because there is no clear silver bullet that identifies the presence of such beliefs (Boudry et al. 2015). Plus, individuals who wish to maintain scientifically unreasonable beliefs have several ways of doing so. They can reinforce their beliefs with questionable tactics such as relying on questionable authorities, pointing to nonrepresentative examples, creating nonfalsifiable theories, and so forth (Hansson 2013). They

can also develop conspiracies to help justify the seemingly unjustifiable (Foster and Clarke 2015).

In sum, humans are animals with remarkable, but limited, cognitive capabilities. They are commonly misled into implausible beliefs and remain resistant to belief revision. Thus, becoming frustrated with woo promoters (or with skeptics) is understandable but perhaps not rational. Being frustrated with people for their stubbornness is akin to being frustrated with sophisticated robots for not recognizing the need to update their programming.

2. Unconditional Positive Regard

Extend unconditional positive regard more broadly. Individuals characteristically set limits on who deserves positive regard and under what conditions. This natural human tendency creates confusion around behaving respectfully because it enables the justification of disrespectful behavior. Carl Rogers, one of psychology's major figures, championed the importance of unconditional positive regard (Rogers 1961); it is difficult to define precisely, but it generally means something like accepting and supporting others in their current state of development without contingency. Some scholars have suggested that unconditional positive regard is better described as *nonpossessive warmth* (Farber and Doolin 2011), a term that seems to more strongly emphasize others as separate beings who control their own lives. Existing evidence suggests that unconditional positive regard is an important predictor of therapeutic success (Farber and Doolin 2011). Of course, skeptics are not conducting therapy when they debate skepticism-related topics, but Rogers did not limit unconditional positive regard in this way. He argued that it is essential for any helping relationship (Rogers 1961).

Unconditional positive regard is great in theory but tough in practice. When I discuss the concept with students, they typically offer test cases, such as questioning whether unconditional positive regard should be extended to people who engage in various forms of truly horrible behavior. This type of consideration is challenging, but it can help clarify the concept. Regarding others positively and without condition does not require one to approve of or excuse others' misconduct. Obviously, no sensible therapist or person is going to approve of sexual assault, for example. Instead, unconditional positive regard means enhancing trust by putting aside personal judgment to consider others as autonomous beings who have the capacity and desire to grow in positive ways.

I like to use the concept of unconditional positive regard to explain how individuals can address behavior without inserting negative personal judgment that disrupts the helping relationship. Imagine, for example, discussing climate change with a staunch climate change denier. An advocate for addressing climate change might dislike the climate change denier at a personal level for stubbornly holding onto a belief that is collectively harmful. This disapproval might be understandable psychologically, but the climate change denier is likely to sense the development of personal antagonism and disengage from the discussion. Climate change advocates who maintain greater understanding about climate science denial might avoid the personal resentment that inhibits persuasion. A less judgmental approach might cause advocates to express concerns about climate change denial (e.g., "Can you understand why people don't believe there is such a conspiracy?") in a more evidence-focused manner that keeps the climate change denier engaged and open-minded. Hyman (2001) did not use the term *positive regard*, but he argued similarly that skeptics should be charitable and fact-focused, both of which avoid personal forms of attack.

Consistently offering truly unconditional positive regard is almost impossible. Rogers (1951) himself recognized that therapists were unlikely to extend unconditional positive regard invariably. Nevertheless, the challenge of complete success should not dissuade people from striving for gradual improvements. Skeptics who heighten their levels of positive regard and offer it to a wider circle of people might be more successful in leading people away from woo. Personally, I have never been able to embrace unconditional positive regard fully, but I can still employ it to a degree. A hot-button skepticism issue for me is faith healing. By attempting to put my personal judgment aside, I can better appreciate the events that cause individuals—correctly or incorrectly—to believe that faith will solicit God's benevolent influence. I can also try to appreciate that most or all people who replace traditional medicine with faith healing believe that they are making good decisions. These considerations don't reduce my conviction against faith healing, but they grant me the patience to discuss faith healing in a more understanding and effective manner.

3. Perspective Taking

Practice perspective taking. Perspective taking is "a cognitive capacity to consider the world from other viewpoints" (Galinsky et al. 2008, 378). Skeptics should consider deliberate perspective taking to better understand communities that promote unreasonable claims. Doing so can inhibit the temptation to dismiss such communities without really considering what they have to say. Taking a different community's perspective also inhibits the tendency to apply stereotypes, decreases the perceived differences between self and members of that community, and reduces in-group favoritism (Galinsky and Moskowitz 2000). In the context of skepticism, perspective taking might cause skeptics to view people who promote unreason as being more diverse and collectively more similar to skeptics than expected.

I doubt that perspective taking will make skeptics more susceptible to adopting the central claims offered by anti-skeptical communities. Understanding another's perspective is not

tantamount to adopting it, and skeptics are generally well versed in identifying legitimate and illegitimate arguments in ongoing skepticism-based debates. Furthermore, evidence suggests that perspective taking would make skeptics more effective in promoting science and reason. Research indicates that individuals who take others' perspectives are more likely to find common ground leading to personally beneficial solutions (Galinsky et al. 2008). Research also indicates that individuals are more willing to like and help others when they believe those others have considered their perspective (Goldstein et al. 2014).

Unconditional positive regard means enhancing trust by putting aside personal judgment to consider others as autonomous beings who have the capacity and desire to grow in positive ways.

4. Aggressive Behavior

Avoid aggressive behavior. People might think of aggression as hurting another person. This type of colloquial definition is often operative, but it overlooks situations in which individuals hurt other people even when it isn't their intent to do so. Dentists, for example, hurt patients when they pull teeth, but it seems misguided to call their behavior "aggressive," because they are not trying to cause harm (dentists depicted in *Little Shop of Horrors* notwithstanding). Accordingly, psychologists generally define aggression around the intent to cause physical or emotional harm (Anderson and Bushman 2002).

Skeptics can argue on behalf of skepticism in ways that are not intended to cause harm. Granted, discussions surrounding skepticism can be emotionally hurtful. Humans are generally averse to being wrong or acknowledging wrongdoing, especially when it involves topics that are important to the self-concept (e.g., identifying as being anti-GMO) or when it suggests a disappointing reality (e.g., God will not cure my child just because I pray for it). Nevertheless, when skeptics engage in skepticism-based debates, neither side is necessarily acting aggressively as long as their goal is to promote a greater principle, such as promoting truth and resolving social problems.

However, skeptics and non-skeptics can lose sight of their intent to create positive forms of persuasion and shift toward behaving aggressively (Hyman 2001). Usually, this aggression involves verbal and nonverbal behavior that is at some level intended to hurt another person emotionally. Skeptics might transition from constructive dialogue to aggressive dialogue for a variety of reasons, such as frustration in the apparent unwillingness of the other person to listen, comments made by the opposition that are hurtful, or a desire to create justice for the other person's harmful behavior (Bushman and Anderson 2001). While these instigations to aggression are psychologically explicable, they are unlikely to be constructive. Skeptics should remember that their purpose in promoting skepticism is to minimize bunk and to encourage a skeptical way of thinking. Remaining cognizant of these goals might help skeptics decrease the likelihood of engaging in ineffective aggressive behavior that reflects poorly on the broader community.

5. The Theory-Practice Gap

Recognize that being a respectful skeptic is difficult and failures are inevitable. The difference between understanding a principle at the conceptual level and behaving consistently with that principle is sometimes called the "theory-practice gap." Even if people agree with the principle of behaving respectfully, they can still behave in disrespectful ways (Druckman 2014). This occurs because individuals commonly struggle to regulate behavior to satisfy long-term goals (Mischel et al. 2014). People might know that they should eat fewer doughnuts, but they give into immediate temptation anyway. Likewise, skeptics might know that treating others respectfully is better for everybody involved but give into old impulses, possibly engaging in *ad hominem* attacks of their own.

I know I sometimes fail to cross the theory-practice gap. Anybody who witnesses such failings might accuse me of being hypocritical—promoting one thing but doing another. If so, I would respectfully disagree. My future failures do not mean that I disagree with the goal of being respectful. Rather, they merely indicate that I am fallibly human in my inability to consistently maintain my composure. Skeptics who wish to behave more respectfully should likewise recognize that the path to respectful skepticism includes pitfalls. They might consider failures as lessons that can help them learn to behave more respectfully—and more effectively—over time.

Conclusion

One final concern involves the evaluation of whether particular behaviors are "disrespectful." Some behaviors are clearly disrespectful, such as publicly belittling others for personal satisfaction. Other behaviors are less clear. Consider, for example, Michael Mann writing that based on evidence provided by DARA (2012), one could argue that the campaign to deny human-caused climate change "con-

stitutes an even greater crime against humanity than the tobacco industry's campaign to deny the health effects of tobacco" (Mann and Toles 2016, 40). Climate change deniers might argue that Mann's claim is disrespectful because it is biased and disparaging. Advocates for addressing climate change might argue that the statement is not disrespectful because it is based on a transparent and realistic summary of the existing science. Nitpicking about whether certain behaviors are disrespectful can be distracting and counterproductive. My intent is instead to describe how skeptics might avoid the more obvious forms of disrespect that inhibit constructive dialogue and contribute to negative perceptions of the skeptical community.

Skeptics who heighten their levels of positive regard and offer it to a wider circle of people might be more successful in leading people away from woo.

Finally, I very much doubt that this first preparation of respectful skepticism represents the best possible dish. I would encourage potential critics to suggest how this recipe might be improved. I only ask one thing: Please make any criticisms hurt as little as possible. ■

References

Anderson, C.A., and B.J. Bushman. 2002. Human aggression. *Annual Review of Psychology* 53: 27–51.

Bauer, M.W., R. Shukla, and N. Allum (eds). 2012. *The Culture of Science: How the Public Relates to Science Across the Globe*. New York: Routledge.

Boudry, M., F. Paglieri, and M. Pigliucci. 2015. The fake, the flimsy, and the fallacious: Demarcating arguments in real life. *Argumentation* 29(4): 431–456.

Boudry, M., and M. Pigliucci (eds). 2017. *Science Unlimited? The Challenges of Scientism*. Chicago, IL: The University of Chicago Press.

Bushman, B.J., and C.A. Anderson. 2001. Is it time to pull the plug on hostile versus instrumental aggression dichotomy? *Psychological Review* 108(1): 273–279.

Cialdini, R.B. 2001. *Influence: Science and Practice*. Needham Heights, MA: Allyn & Bacon

DARA. 2012. *Climate Vulnerability Monitor: A Guide to the Cold Calculus of a Hot Planet*, 2nd edition. Barcelona, Spain: Fundacion DARA Internacional.

Dennett, D.C. 2013 *Intuition Pumps and Other Tools for Thinking*. New York: W. W. Norton.

Druckman, D. 2014. Using research findings in practice: From knowledge acquisition to application. In P.T. Coleman, M. Deutsch, and E.C. Marcus (eds), *The Handbook of Conflict Resolution: Theory and Practice*, 3rd edition. San Francisco, CA: Jossey-Bass, 1023–1042.

Farber, B.A., and E.M. Doolin. 2011. Positive regard. *Psychotherapy* 48(1): 58–64.

Foster, C.A., and J.A. Clarke. 2015. The pseudoscientific leader: Do bad leaders endure by using pseudoscientific thinking? In D. Lindsay and D. Woycheshin (eds), *Overcoming Leadership Challenges: International Perspectives*. Kingston, ON, Canada: Canadian Defence Academy Press, 67–87.

Galinsky, A.D., W.W. Maddux, D. Gilin, et al. 2008. Why it pays to get inside the head of your opponent: The differential effects of perspective taking and empathy in negotiations. *Psychological Science* 19(4): 378–384.

Galinsky, A.D., and G.B. Moskowitz. 2000. Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology* 78(4): 708–724.

Gawronski, B., and F. Strack (eds). 2012. *Cognitive Consistency: A Fundamental Principle in Social Cognition*. New York: The Guilford Press.

Glass, J., V.L. Bengtson, and C.C. Dunham. 1986. Attitude similarity in three-generation families: Socialization, status inheritance, or reciprocal influence? *American Sociological Review* 51(5): 685–698.

Goel, S., W. Mason, and D.J. Watts. 2010. Real and perceived attitude agreement in social networks. *Journal of Personality and Social Psychology* 99(4): 611–621.

Goldstein, N.J., I.S. Vezich, and J.R. Shapiro. 2014. Perceived perspective taking: When others walk in our shoes. *Journal of Personality and Social Psychology* 106(6): 941–960.

Hansson, S.O. 2013. Defining science and pseudoscience. In M. Pigliucci and M. Boudry (eds), *Philosophy of Pseudoscience: Reconsidering the Demarcation Problem*. Chicago, IL: University of Chicago Press, 61–77.

Hilton, J.L., and W. von Hippel. 1996. Stereotypes. *Annual Review of Psychology* 47(1): 237–271.

Hyman, R. 2001. Proper criticism. Skeptical Inquirer 25(4): 53–55. Available online at https://www.csicop.org/si/show/proper_criticism.

Loehlin, J.C. 1993. Nature, nurture, and conservatism in the Australian twin study. *Behavior Genetics* 23(3): 287–290.

Mann, M.E., and T. Toles. 2016. *The Madhouse Effect: How Climate Change Denial Is Threatening Our Planet, Destroying Our Politics, and Driving Us Crazy*. New York: Columbia University Press.

Mischel, W., A.L. DeSmet, and E. Kross. 2014. Self-regulation in the service of conflict resolution. In P.T. Coleman, M. Deutsch, and E.C. Marcus (eds), *The Handbook of Conflict Resolution: Theory and Practice*, 3rd edition. San Francisco, CA: Jossey-Bass, 310–330.

Nickerson, R.S. 1998. Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology* 2(2): 175–220.

Rogers, C. R. 1951. *Client-Centered Therapy*. Boston, MA: Houghton Mifflin.

———. 1961. *On Becoming a Person: A Therapist's View of Psychotherapy*. New York: Houghton Mifflin.

Visser, P.S., and R.R. Mirabile. 2004. Attitudes in the social context: The impact of social network composition on individual-level attitude strength. *Journal of Personality and Social Psychology* 87(6): 779–795.

Craig A. Foster is a professor in the Department of Behavioral Sciences and Leadership, U.S. Air Force Academy, Colorado.

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of any part of the U.S. government.

The Dematerialization Crusade

What have spiritualism and dematerialization added to the body of certified knowledge? Although many proponents of dematerialism have been distinguished scientists, they earned their stripes by inventing theories or methods that had little or nothing to do with that.

MARIO BUNGE

Spiritualism is the belief in the real existence of immaterial entities such as angels, ghosts, and freely roaming souls. Dematerialization is the attempt to rid the sciences of the matter concept, thus replacing materalism with spiritualism.

Alternative medicine is likely to be the most popular and best-paying spiritualist business, as shown by the many clinics offering homeopathic, acupuncturist, and chiropractical treatments (Randi 1982; Sanz 2016). Contrary to a widespread belief, the clientele of these practices are not uneducated persons but people who have heard about them at schools and universities (Alcock 2018). We reject them not because of philosophical bias but because they have failed experimental tests on top of having failed to exhibit the mechanisms of their purported efficacy (Bunge 2013). Thus, the homeopathic nostrums are mainly water, which explains why they are usually harmless except when they divert very sick people from scientifically based treatments.

The painter Wassily Kandinsky (1912) gave perhaps the best description of dematerialization in the plastic arts. He strove to substitute form for content or matter, as in his own paintings, in particular his compositions, and those of Paul Klee, Piet Mondrian, and some of the surrealists. For instance, I see Kandinsky's "compositions" as decompositions or disintegrations and cannot help being amused by Magritte's paradoxes.

Of course, none of the so-called abstract artists succeeded in eliminating matter, since they worked with brushes and canvasses or chisels and marble blocks, all of

which are material entities. What they did was to paint or sculpt *non-representative* things. That is, they created artworks devoid of clues and systems and therefore capable of evoking different subjects in different viewers. In sum, they did not produce anything abstract, since only mathematicians deal with abstractions, such as sets and lattices of nondescript elements.

We reject alternative medicine treatments not because of philosophical bias but because they have failed experimental tests on top of having failed to exhibit the mechanisms of their purported efficacy.

Spiritualism and the dematerialization crusade have thrived almost everywhere—except in engineering, chemistry, bookkeeping, and the law. Why these exceptions? Contrary to naive expectations, contemporary physics is rife with spiritualist beliefs and has been the cradle of what may be called the "Dematerialization Crusade." This movement tried to expel matter from science and make us believe that physicists have replaced it by the word *observer*—or, as Joseph Bell put it, substituted "observable" for "beable."

In 1921, the great logician Bertrand Russell rejected the matter/mind split and proposed neutral monism (Russell 1921). This proposal does not help the physician who has to opt between pill and prayer or the engineer who must accept or reject the suggestion that he should prefer magic carpets to aircrafts. No wonder that neutral monism has been all but forgotten. Nor do we take seriously Russell's (1927) idea that matter is a logical construction, since the students of material entities ignore logical analysis. Logic is admirable, but logical imperialism is incapable of handling matters of fact.

The eminent astrophysicist Arthur Eddington (1939) claimed that he could calculate all the universal constants of physics without using any empirical data. But he persuaded nobody, and Max Born (1943) published a scathing criticism of Eddington's apriorism, and his attempt was an isolated episode. The Dematerialization Crusade in science was launched at the end of the nineteenth century by Ernst Mach (1890 [1914]), the first to observe and measure bullets moving at supersonic speeds. Mach also attempted to rid mechanics of the concept of mass by redefining it in terms of acceleration. To achieve this goal, he started with Newton's postulate "Force = mass X acceleration" and created a vicious circle (Bunge 1968). But such a logical flaw is nothing compared with his treatment of acceleration as anything other than change of the velocity of a bit of matter. This becomes obvious when acceleration is analyzed as a function from the Cartesian product of the following sets: the set P of generic bits of matter, the set F of reference frames, the set T of time instants, and the set U of units such as $cm.sec^{-2}$.

In science, the Dematerializtion Crusade culminated at the end of the past century with the distinguished theorist John Archibald Wheeler's "its from bits" program, which intended to replace bits of matter with information bundles (Barrow et al. 2004). An objection to this attempt is that focusing on information does not authorize us to forget that every physical magnitude is the property of something material, whereas the bit is a unit of the information traveling along a communication channel, such as a telephone line, every bit of which is material. Thus, the immaterial bit stands on the material communication channel.

The strongest argument for the replacement of "matter" with "observable" was the Copenhagen interpretation of the quantum theory advocated by Niels Bohr, Werner Heisenberg, and other founders of the theory. The core of this school is the belief that all the microphysical things and properties are mind-dependent. This thesis is open to a number of objections, among them that observers are composed of microphysical entities, and that the historical sciences have shown that physical things have been around long before the birth of microphysics roughly a century ago.

The special theory of relativity was another victim of spiritualism, on the strength of the confusion of "frame of reference" with "observer," and of "relative" with "apparent" or "subjective." The fact that the theory is used in astrophysics to account for a number of physical processes in uninhabited corners of the universe proves that the indicated identifications are indeed incorrect. In particular, the expression "masses are relative" is short for "the mass values are relative to the reference frame." More concisely, Reference Frame ≠ Observer, hence Relative to a Reference Frame ≠ Observer-Dependent, where Reference Frames are

None of the so-called abstract artists succeeded in eliminating matter, since they worked with brushes and canvasses or chisels and marble blocks, all of which are material entities.

material entities, such as gyroscopes, endowed with spatial directions and clocks. (Caution: do not confuse such material items with coordinate systems. Coordinate systems are mathematical representations of reference frames.)

Biology was another science that until about 1900 was committed to immaterial entities such as *élan vital* (vital impetus) and *Bildungskraft* (constructive force), as well as goal-directedness (Mahner and Bunge 1997). These remnants of magical thinking were swept aside as so many obscurantist residues of prescientific thought by the physicalist reductionists of the early twentieth century. To be sure, some teleology did remain, but only in psychology and social science, where it refers to the goal-striving activities of actors.

Psychology is perhaps the only science where spiritualist ideas are still influential, as shown by the resilience of mind-body dualism, psychoanalysis, and related brainless myths, such as the proverbial "mind over brain actions," the scientific translation of which is of course "cerebral cortex over immune actions," exemplified by the placebo effects.

Psychology is perhaps the only science where spiritualist ideas are still influential, as shown by the resilience of mind-body dualism, psychoanalysis, and related brainless myths.

Social science is the last prestigious refuge of spiritualism. Indeed, the social theories taught at most universities involve such immaterial items as invisible hand, free trade, consumer power, and market wisdom. The people who invoke such ideas overlook monopolies, crony capitalism, registered lobbyists, military aggressions launched to protect powerful private interests, and the supposedly liberal ideals protecting such interests.

Why have engineers, lawyers, management experts, and bookkeepers escaped the spiritualist traps? I suggest that those experts offered advice to hard-nosed clients who sought practical results, not the pieties of the believers in the power of elusive self-existing and self-moving ideas.

Move one step from materialist engineering and you encounter architecture, which has welcomed a number of spiritualist gurus as well as esoteric practices such as feng shui (Matthews 2018). Why are the practitioners of such superstitions thriving? Because they find plenty of clients, mostly private individuals rather than hard-nosed businessmen or government officials. These people can be fooled by ideas dressed in modern jargon, not by ancient myths.

To conclude, what has the Dematerialization Crusade added to the body of certified knowledge, and what is the current state of materialism in science? Although many of the proponents of dematerialism have been distinguished scientists, they earned their stripes by inventing theories or methods that had little or nothing to do with said crusade.

For example, we revere Niels Bohr for his early atomic model rather than for his philosophical writings in favor of the Copenhagen "spirit." As for the fate of materialism, suffice it to remember the advances of condensed matter physics since the end of World War II, or the economic changes brought about by the commercialization of the many synthetic materials over the past half century: semiconductors, stainless steel, superconductors, synthethic oil, synthetic rubber, fullerenes, and synthetic fibers such as nylon, rayon, velcro, and kevlar.

Anybody interested in playing with the Ouija board? ■

References

Alcock, James. 2018. *Belief.* Amherst, NY: Prometheus Books.

Barrow, John D., Paul C.W. Davies, and Charles L. Harper Jr., eds. 2004. *Science and Ultimate Reality*. Cambridge: Cambridge University Press.

Born, Max. 1943. *Experiment and Theory in Physics*. Cambridge: Cambridge University Press.

Bunge, Mario. 1968. On Mach's nonconcept of mass. *American Journal of Physics* 36: 167.

———. 2013. *Medical Philosophy*. Singapore: World Scientific.

Eddington, Arthur. 1939. *The Philosophy of Physical Science.* Cambridge: Cambridge University Press.

Kandinsky, Wassily. 1912. *Uber das Geistige in der Kunst, Besonders Malerei.*

Mach, Ernst. 1890 (1914). *The Analysis of Sensations*. Chicago: Open Court.

Mahner, Martin, and Mario Bunge. 1997. *Foundations of Biophilosphy.* Berlin, Heidelberg, New York: Springer.

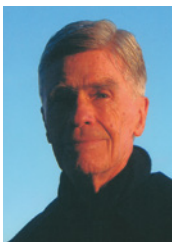
Matthews, Michael. 2018. Feng shui: Educational responsibilities and opportunities. In M.R. Matthews, ed. *History, Philosophy and Science Teaching: New Perspectives*. Dordrecht: Springer, 3–41.

Randi, James. 1982. *Flim-flam*. Amherst, NY: Prometheus Books.

Russell, Bertrand. 1921. *The Analysis of Mind*. London: George Allen & Unwin.

———.1927. *The Analysis of Matter*. London: Routledge & Kegan Paul.

Sanz, Victor-Javier. 2016. *Las terapias espirituales*. Pamplona: Laetoli.

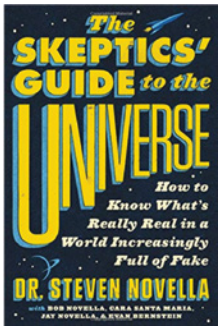


Mario Bunge is the Frothingham Professor of Logic and Metaphysics in the Department of Philosophy at McGill University. He is author of more than 500 papers and seventy-four books, including *Foundations of Physics*, the nine-volume *Treatise on Basic Philosophy*, *Medical Philosophy*, and most recently *From a Scientific Point of View* (Cambridge Scholars, 2018). He is a CSI fellow.

First Book by the Rogues of the *Skeptics' Guide* a Terrific Read

Rob Palmer

"Science is formalized reality testing."
—*The Skeptics' Guide to the Universe*



The Skeptics' Guide to the Universe: How to Know What's Really Real in a World Increasingly Full of Fake. By Steven Novella with Bob Novella, Jay Novella, Cara Santa Maria, and Evan Bernstein. Grand Central Publishing. 2018. ISBN-13: 978-1538760536. 512 pp. Hardcover, $19.49.

The Skeptics' Guide to the Universe, the first book written by the hosts of the venerable skeptical podcast of the same name (abbreviated as SGU), is organized into five sections. The first is "Core Concepts Every Skeptic Should Know," which begins with a discussion of the meaning of scientific skepticism itself. This introduction will be especially helpful to readers unfamiliar with this concept. "Core Concepts" is a large topic, covering almost half the book, and thus it is divided into subsections that each have a number of chapters. The subsections are:

- **Neuropsychological Humility** (pareidolia, hypnagogia, the ideomotor effect, etc.) These are some of the most important skeptical concepts discussed.
- **Metacognition** (biases, logical fallacies, anomaly hunting, appeal to nature, etc.) That last one discusses the abomination that is the organic food movement. Don't miss it.
- **Science and Pseudoscience** (postmodernism, conspiracy theories, p-hacking, etc.) I generally get a glazed look in my eyes when p-hacking comes up on the podcast, but this chapter's description of the issue was extremely helpful to understanding the basics of this complex topic.
- **Iconic Cautionary Tales from History** (Clever Hans, cold reading, quantum woo, N-rays, etc.) Ever hear of N-rays? They were "discovered" by science right after X-rays, but they do not actually exist. The full scope of the mistakes made at the time by scientists insufficiently applying skepticism is both appalling and instructive. Three hundred scientific papers were published by one hundred experimenters over three years, all declaring this imaginary phenomenon to be real.

I generally get a glazed look in my eyes when p-hacking comes up on the podcast, but this chapter's description of the issue was extremely helpful to understanding the basics of this complex topic.

The next section is "Adventures in Skepticism," which includes six personal accounts regarding skepticism. Unlike the rest of the book, each of these chapters—one each from the five current podcast cohosts plus one from Perry DeAngelis, an original SGU founder and cohost who died in 2007—is written in a voice other than Steve Novella's. My favorite chapter was Jay Novella's, where you will learn why Perry voted to remove him from the podcast.

Section three covers "Skepticism and the Media," which has chapters on topics including false balance, fake news, and the problems with bad science journalism. Section four is "Death by Pseudoscience," which reveals some worst-case scenarios resulting from science ignorance or denialism. Topics include naturopathy and exorcism. Many disturbing cases are provided. The final section, "Changing Yourself and the World," provides a nice summary of Steve's philosophy on skepticism and includes his suggestions regarding applying skepticism in your life.

Each of the book's five sections begins with an introduction preceding

the first chapter. Don't skip over the first section! The details of the "great airship hoax" from the turn of the twentieth century (where numerous airplane sightings were reported prior to the first flight of such a thing, just due to public anticipation of flying machines being created) was something I had not heard of before. This tale will be helpful in future arguments with my alien spacecraft–believing friends.

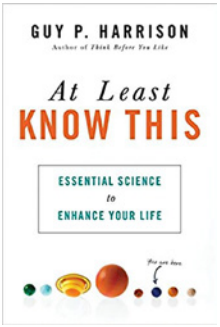
Many chapters begin with a short description of the subject, followed by a very pertinent quote. It's sort of like the quote-of-the-week at the end of every SGU podcast, but these quotes apply more directly to that chapter's specific content. The sporadic use of segment names from the podcast will resonate with SGU fans. The book is well referenced and has an extensive index, making it easy to find any detail one may wish to locate. This book is massive. Due to time constraints, I listened to the audiobook version during my daily commute. For the two weeks it took me to finish, I couldn't wait to get back in the car to pick up where I left off. I am definitely looking forward to seeing (or hearing) what the SGU rogues come up with next. ■

The full scope of the mistakes made by scientists insufficiently applying skepticism at the time N-rays were "discovered" is both appalling and instructive.

Rob Palmer, also known as "The Well-Known Skeptic," is a longtime skeptic and part of the Guerrilla Skepticism on Wikipedia (GSoW) project.

What We Know: A Lay Public Primer

Russ Dobler



At Least Know This: Essential Science to Enhance Your Life. By Guy P. Harrison. Amherst, New York: Prometheus Books. 2018. ISBN-13: 978-1633884052. 320 pp. Paperback, $19; ebook, $11.99

Sometimes to understand the universe, you need to understand a man. Journalist Guy P. Harrison has been adjacent to the skeptical community for a while now, writing books on religion and more popular treatments of typical skeptical topics, such as 2013's *Think: Why You Should Question Everything*. You won't see him at a lot of conventions, but maybe that's a good thing, as he's out fighting the good fight beyond the echo chamber.

So it makes sense that Harrison would attempt a book such as *At Least Know This: Essential Science to Enhance Your Life*, which aims to summarize and simplify much of what we know about the origins of our universe and ourselves. Whether intentional or not, *At Least Know This* feels a bit like an attempt at a twenty-first century version of *Cosmos*—which is a tall order indeed.

Harrison brings his synthesis skills (and contacts) as a journalist, as well as his degrees in history and anthropology, to the task. This is evident in large sections discussing racism and agriculture, both of which he's against. Well, that's not entirely true; Harrison understands that without agriculture and the settling down it enabled, we wouldn't have modern society and the scientific advances that sprang from it. He just wants to remind everyone, rightly, that it comes with certain costs.

But racism? That one's too far afield for Harrison. Given his education, he's aware of the current status of scientific research on the squishiness of race. There may not in fact be biologic races, and if there are, they're more sensibly divided by invisible genetic markers, not on superficial phenotypic traits such as skin color. Dividing them that way can wrongly lump everyone of African ancestry together, even though many Africans are more closely related to other "races" than they are to the more genetically distinct east Africans.

What troubles Harrison is how the public is unable to see or accept this (probable) truth. It's plain to him (and to anyone who's looked into the matter and values the rigor of the scientific method), but as skeptics we sadly know that much of the population just doesn't think that way. Facts don't change people's minds, so to expect them to instantly choose inscrutable, jargon-filled evidence while abandoning what they see with their eyes is a path to disappointment. Getting the message through probably isn't impossible, but it shouldn't surprise anyone that it's exceedingly difficult.

Harrison is clearly more sure-footed on some topics than others, but the vast majority of the book is meticulously well-researched and referenced, with a staggering fifty-two pages of notes and citations. *At Least Know This* genuinely does cover a breadth of topics and information spanning all of time and space, from the beginning of the universe to

the formation of the solar system and the genesis of life, a Herculean organizational effort that does indeed give a lay public primer on the most often asked questions of existence. This is where the book excels.

For that reason, though, it may not be the best read for audiences already steeped in science and skepticism. By and large, those folks will likely find *At Least Know This* to be an elementary review, but, as noted, Harrison's trying to reach others, not us. Even then, there are some previously uncovered gems that skeptics can use when engaging those with misguided beliefs, such as the idea that memory is grossly fallible because it's not evolved to be a recording but an advisor of what to do in the future. The fidelity is only as high as it needs to be, and that's a low bar.

For the uninitiated, the book is a fine distillation of what a person should know to be a world citizen, but Harrison doesn't make the best case as to why that's important in the first place, beyond the obviously needed preparation for potential doomsday scenarios. The reasons for understanding our history are less clear. He suggests "all thoughtful, modern people would want to contemplate" how today's humans evolved but stops short of explaining the practical value. If it's expected prejudice would evaporate with better understanding, that is not stated, nor is it realistic.

Facts don't change people's minds, so to expect them to instantly choose inscrutable, jargon-filled evidence while abandoning what they see with their eyes is a path to disappointment.

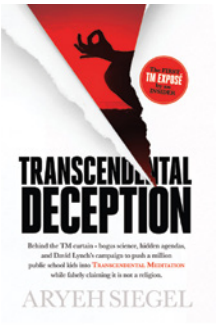
And for a book meant to induce awe, *At Least Know This* could use more illustrations or at least some better formatting. The photos included aren't very instructive, and there are several boxed, narrative "asides" that interrupt the main flow. These things are likely victims of originating from a small publisher, but for a work with such a grand intent, they have to be noted.

At Least Know This: Essential Science to Enhance Your Life is not the next *Cosmos*, but it doesn't have to be. It's still a book you can hand to someone with little scientific knowledge to get them up to speed on just about everything. That's no small feat. Exactly *how* we obtained this information isn't always clear, which may put a bur under the saddles of science purists who prioritize methodology over trivia, but, hey, one step at a time. Bring the wonder, and maybe the rigor will follow. ■

Russ Dobler is a geophysicist, journalist, and board member of the New York City Skeptics. He edits a science and skepticism section for the pop culture website AiPT! Comics and would love to publish your work there.

A Look into the Transcendental Deception

Joseph Szimhart



Transcendental Deception: Behind the TM Curtain—Bogus Science, Hidden Agendas, and David Lynch's Campaign to Push a Million Public School Kids into Transcendental Meditation While Falsely Claiming It Is Not a Religion. By Aryeh Siegel. Los Angeles, CA: Janreg Press. 2018. ISBN 978-0-9996615-0-5. 222 pp. Paperback, $17.99.

The subtitle indicates the content of this well-researched yet straightforward response to the quasi-religious sect founded after 1955 by Maharishi Mahesh Yogi (1918–2008). Mahesh first taught his religion as "transcendental deep meditation" in India. Later, this savvy businessman trademarked Transcendental Meditation (TM) for foreign consumption. A major meditation cult was born: *Cultus* means to care for; TMers care for themselves and the world through a special meditation technique.

Before I get into my review of the text, I want to relate an anecdote of my encounter with an average TM user in Santa Fe, New Mexico, decades ago. I was in the French Pastry Shop of the La Fonda Hotel reading an article critical of Transcendental Meditation. The headline caught the interest of a man in his thirties who sat at a table behind me. He was nicely attired in a sport coat without a tie. He told me that he was in town as a sales rep for a small business. Without any prompt from me, he launched into defending his TM practice that has helped him to become a success and kept him feeling well for eight years.

At that stage in my cult intervention career, I had helped hundreds of adults exit from a wide variety of controversial sects and self-help movements, including TM. I told him only that I thought the article was fair and well-researched and that I was an artist curious about new religions. His litany of arguments favoring TM were numbingly familiar to me: the "scientific" studies, the celebrities behind TM, "TM is not a religion," and how anyone in any religion can practice TM. Predictably, his default dismissal of my critical stance was based on this common but spurious argument: You have not experienced TM, so how can you know what it is about?

This book is a clear warning to go beyond propaganda and experience before you absorb the snake oil or give it to your kids.

My only pushback was to ask him whether he ever experienced yogic levitation or paid thousands of dollars to TM in India for a yagya ceremony. He appeared to not know about yagyas, but he gathered I knew more about the movement than he had "experienced." He was never ritually initiated into (paid for and took) the yogic flying technique course; nevertheless, he tried to defend the weird hopping-in-a-lotus-position as scientifically plausible by pointing to a "brain wave coherence" study he read. We had been talking for over a half hour with me mainly listening. I stopped him, stating I had to go. We shook hands, I wished him well, and I left my cold, unfinished coffee behind with a tip. I wanted to finish the article somewhere else with my back to a wall.

It takes an enormous amount of patient, respectful, and educational exchange to open any true believer's mind to new ways of looking at their experience and to assess overvalued beliefs—days of that in most cases. As my pastry shop neighbor poured out his apologetic promotions for TM, I imagined listening to someone from a Christian evangelical sect, from Scientology, from est or Landmark, from Eckankar, from Ramtha, or from any number of similar groups with seemingly "coherent" if totalistic worldviews. As I said, his arguments were numbingly familiar.

Aryeh Siegel did experience TM, first as an initiate in 1971, then as a teacher from 1975. He and his wife finally quit the movement in 1981, noting that four hours of meditation daily and expensive techniques were not getting them anywhere. He later ran a community mental health facility for several years and eventually became a real estate broker. He left that TM chapter of his life behind until 2015 when he noted with alarm that TM was again being promoted as a secular technique to public schools through the David Lynch Foundation. And that is the purpose of this book: To offer a concise history and factual assessment of a controversial religious practice that promotes itself as a proven well-being technique with no occult (hidden metaphysical) agendas. *Transcendental Deception* is a clear warning to go beyond propaganda and experience before you absorb the snake oil or give it to your kids.

After reading this book, it should become clear that TM is more than religion disguised as a science. The business model employed by TM's founder relies on hijacking science to enhance a belief in occult powers. Religion's chronic flaw has been the superstitious desire to manipulate reality through prayer, ritual, sympathetic magic, and casting spells. It is of interest here that one translation of *mantra* is *to cast a spell*. With the rigorous rise of the sciences in the past few hundred years, the occult arts have been discredited. Proto-astronomy, for example, divided into astrology and astronomy. Alchemy fell away from chemistry. Despite efforts by giants in science such as Isaac Newton and Robert Boyle (1627–1691) who both diligently tried to apply occult arts, including alchemy, the scientific method won out as our best means to improve health, locomotion, and our grasp of reality.

Siegel's book reminded me that humanity's deeply ingrained impulse to use mental and spiritual power to transcend and manipulate reality remains in every culture, including the post-industrial nations. New cults continue to appear with techniques for sorcery, magic, extrasensory perception, and communication with metaphysical beings. Nineteenth-century New Thought and Theosophy groups have proven that mankind's desire for occult powers has not waned in the scientific era. "Science" has been co-opted by movements promoting occult or paranormal powers, including Christian Science, Scientology, Science of the Mind, and the Church of Divine Science. The Maharishi of TM knew what he was doing when he made more and more outrageous claims for the occult powers one can gain through TM: levitation without wings or machines, for example. At the very least, the average person paying a hefty fee for a special mantra harbors hope that the puja ceremony to Guru Dev and the Hindu gods will tap a real cosmic force to enhance the power of their TM practice. That is religion—not science.

To support his allegation that TM is a deceptive business, Siegel cites court cases, properly run studies on effects of meditation, and ex-member testimonies. Siegel mentions the fine documentary *David Wants To Fly* by German filmmaker David Sieveking (2010). I bought Sieveking's film when it came out, but I had to order it from Europe at the time due to TM's legal efforts to block distribution in Canada and the United States. Why would TM want to stop freedom of speech? The film is an honest effort to document one young David Lynch fan's effort to seek why TM has been so important to his hero's filmmaking career. In his journey, Sieveking managed to interview Lynch, become initiated into TM practice (for a fee), then change course when his many questions were not being addressed by TM's leaders. Sieveking turned to prominent ex-TMers to discover the hidden and not-so-hidden deceptions in

the movement. He managed to expose the fraud behind the Vedic Cities where thousands of "pandits" were supposedly meditating to bring peace and harmony to the planet. The one in India, the Brahmasthan, was practically a ghost town with a few dozen meditators at the time. The proposed Vedic Cities would have 8,000 pandits (meditators) doing what amounts to a meditation mill to send good vibrations to the universe. TM meanwhile has been fundraising for $400 million to support these silly ventures. In 2014, *India Today* reported that Maharishi Vedic City in Iowa recruited 1,050 young Indians, over 150 of whom defected. These young men were promised high school educations and room and board for their planet-saving efforts—if indeed they comprehended what they were hired for. They were not high-level TM members with purported TM powers.

In Siegel's book we learn that TM has relied partially on multimillion-dollar grants from the U.S. National Institutes of Health to fund services to schools and prisons to study TM. The NIH agencies gave TM nearly $23 million from 1992 through 2016, then the awards stopped. Siegel offers evidence that the NIH finally discovered or admitted that TM is nothing special with all the new studies about many forms of mindfulness and meditation that are equally effective yet offered for low fees or are free. TM's latest effort at proselytizing through many high-profile celebrities supporting the David Lynch Foundation may be an effort to rescue a failing and deceptive business model. Furthermore, studies have shown that all forms of meditation may be overhyped as to effectiveness for lowering blood pressure and bringing about inner harmony. The one-size-fits-all offerings of most yogic and meditation styles may be too good to be true.

Another anecdote here regarding David Lynch: In 2014, Lynch had a showing of art at the Pennsylvania Academy of Fine Arts (PAFA) in Philadelphia. *David Lynch: The Unified Field* was Lynch's first major art show in the United States (see https://www.pafa.org/davidlynch). Lynch graduated from PAFA two years before I began attending in the early 1970s. As alumni, my colleague Brian O'Neill and I attended the show with hopes of hearing Lynch lecture, but his lecture was sold out. By coincidence, we were behind the lecture hall when Lynch appeared alone outside the back door smoking a cigarette. Brian, a photographer, walked up to him and requested a photo and brief interview, to which Lynch complied after he put out his cigarette. The scene made me wonder: What's with the nicotine? A major promoter of TM does not have the means or desire to kick a bad habit.

On page 144, Siegel states the "goal of this book" is to "empower concerned citizens, particularly parents, to confront and expose TM's deceptions and secrets … . The welfare of children is what matters." As TM exposés go—I have several in my collection—Siegel's book functions very well. It offers a solid survey of what TM is all about for people new to the sect as well as a great reference for anyone familiar with TM. If any school director has questions about David Lynch's foundation to promote TM in public schools, give them this book immediately. We owe it to the children. ■

This review was written for the *International Journal of Cultic Studies* (Vol. 10, 2019) and is reprinted here by permission.

Joseph Szimhart has worked since the 1980s as a cult intervention and research specialist. He received a Lifetime Achievement Award in 2016 from the International Cultic Studies Association. His novel *Mushroom Satori: The Cult Diary* appeared in 2013.

LETTERS TO THE EDITOR]

Illusions and Angst

In "Grand Illusions and Existential Angst" (November/December 2018), Alan Scott appears to be arguing that free will is merely an "illusion" and that therefore it does not really exist. At the risk of repeating what may be well-worn arguments, the following points immediately leap out in response:

1. In common with all others who profess to deny the existence of free will, Scott clearly does not really believe what he is saying. Otherwise he wouldn't even bother to get up in the morning, let alone write an article about it that is clearly intended to be read by reasoning individuals and that inevitably is littered with implicit assumptions that individuals can choose how to act.

2. The whole concept of an "illusion" implies that there is some conscious entity that is being misled into believing that something is the case when in fact it isn't. With no conscious beings to observe them, there are no illusions.

3. The concept of "self" implies free will. If I do not have free will, then there is no "I." And how can "I" possibly be mistaken about the existence of my own self? For "I" to be mistaken about this, there must logically be an "I."

4. Finally, quite apart from the above, the "illusion" of free will *is* free will. That is all it is. If you want to call it an "illusion" then okay, but it doesn't mean it isn't real. Just because it may arise out of the actions of neurons, and ultimately the interactions of fundamental particles, does not mean that it does not exist. The goal is to find out *how* free will comes to exist—not to avoid the issue by simply denying its existence. The bottom line is that denial of free will is simply a cop out, i.e., I can't explain how it comes to exist, so I will simply deny its existence.

James Adams
Bromley, England, UK

I believe the article on free will, trenchant as it was, slighted the visceral reason for the debate. Freedom, if understood as an uncaused cause or the random die toss of quantum physics, satisfies no one because it leaves unanswerable the question we ask most:

Why? Determinism gives a "why" but is resisted by many because we too easily think of the mechanics of a wind-up toy or some naive presentations of behaviorism that deny individuality and seem to reduce everything to the result of pressing a few operant conditioning buttons.

The attachment to free will stems from the insistence that we are born individuals who can act reasonably and can learn to modify our behavior to meet goals and ideals. My choosing to write today is no doubt the product of my genes and prenatal environment, my education and temperament, my health, how well I slept last night, and a million things more. I am expressing views that have changed over the years with my personal history. But the only reasonable short hand way I can state why I am writing is because *I chose to*. And that is correct because I am the sum of all those things. Take them away and there is no "I" left.

Scott Mages
Pittsburgh, Pennsylvania

In "Grand Illusions and Existential Angst," Alan Scott uncritically embraces determinism to argue against the idea of free will. There is good reason to assert that free will is an illusion, but it's not because we live in a deterministic universe.

Determinism was an interesting philosophical plaything in the beginning of the nineteenth century when Laplace first told us about a demon that, knowing the position and momentum of every atom in the universe, could compute the future and past unerringly using the laws of classical mechanics. However, since then we have learned something about the limits of Newtonian physics.

First, Professor Heisenberg taught us that we simply cannot know both the position and momentum of elementary particles. You might argue that those particles nevertheless do have a fixed position and momentum even if we cannot measure them. But again, you would be wrong. Quantum physics tells us that at any given moment in time, a significant portion of the universe exists as elementary particles inhabiting superpositions of each of their possible positions and momentums. They cannot be said to exist in any one place at all. In addition, what we now know about the laws of physics cannot tell us anything with certainty about what the state of those particles will be if and when decoherence does occur. And without that certainty, determinism simply vanishes along with Laplace's demon. Any miss is as good as a mile.

Determinism should not be taken as a given.

George W. Barz Jr.
Wilbraham, Massachusetts

Alan Scott replies:

The three letters are cogent ruminations on the concept of free will emanating from the encampment of science and reason. I do acknowledge that my use of the word and concept of determinism *could be a source of confusion and/or debate.*

Moreover, I cogitated on James Adams's statement "… Scott clearly does not really believe what he is saying. Otherwise he wouldn't even bother to get up in the morning … ." Adams seems to be positing that an implicit philosophical contradiction, or recursive paradox, underlies my argument.

I am cognizant of the historical meaning attached to the word determinism *and its invalidation by the inescapable indeterminism associated with quantum physics. Chance does rule individual events, but nature, i.e. fundamental forces, determines the odds (A. Hobson, 2003,* Physics: Concepts and Connections*, 3rd Edition, Prentice Hall, p. 404). Whereas, proponents of free will must necessarily refute the latter.*

Consider the sunflower plant. Not one student of scientific ethos would, in their right mind (dare I say), argue it faces the sun by free will. Just add more complexity regarding my decision to get out of bed in the morning. It all reflects the grand struggle over the eons between the randomizing action of thermal motion of atoms/molecules and the ordering effect of their electrostatic/electrodynamic interactions.

On Visiting Darwin's Home

I wanted to give a loud *Amen!* to the thoughts of Kendrick Frazier in his commentary for upholding the idea that we need to honor and keep reminding ourselves of the great scientists and rationalists who have paved the way for us in our understanding of our world and showed us how to "think greatly" ("Thoughts on Visiting Darwin's Home, Down House," November/December 2018).

I have thought a good bit about how we should do that to reach the greatest number of people. Sadly, I fear most of our public education does a poor job with this important task.

I have only one criticism of Frazier's thoughts, and that was his statement that today's entertainers and athletes well deserve their fame. While I do think highly of some of our most talented entertainers and athletes, I believe most in those groups are not so deserving for their meager accomplishments, and they certainly don't compare in any way to the likes of Darwin, Hume, and other great minds who have made giant strides and added greatly to the human quest for understanding.

David Zeigler
Wimberley, Texas

Reading Kendrick Frazier's commentary about visiting famous places associated with great thinkers reminded me of my visit to the home Albert Einstein and his wife, Mileva, lived in during his time as a patent clerk in Bern, Switzerland. The beautifully preserved second floor apartment and museum contains memorabilia and period furniture. Most important, it displays Einstein's reading stand and the desk he used at the Patent Office (just a few blocks away).

It was there in 1905 that Einstein wrote three papers, dealing in turn with atomic theory, quantum physics, and special relativity, laying the foundations of modern physics. It occurred to me that if in a thousand years there are interplanetary tours, this place would be one of the mandatory stops.

I have had the privilege of seeing both this house and Darwin's home, Down House. At each place I experienced to some extent the numinous feeling described in the visit of religious people to their sacred places. If skeptics had cathedrals, these surely would be two of them.

Terry Smiljanich
Former Chair, Tampa Bay Skeptics
Gainesville, Florida

Fake News

Interesting bit on the APA fake news symposium ("Why We're Susceptible to Fake News—and How to Defend Against It," November/December 2018). However, focusing on the logical fallacies and our susceptibility misses an important point. Fake news is rampant because entertainment has displaced information in the mainstream media. Here's a quick checklist for your evening newscast or newspaper:

- News is something that happened (a fact) or something a *named* person has said. It might include other contextual facts or analysis by an expert, whose qualifications are stated and verified as part of the report.
- News is a report, not a story.
- News is not what some unnamed "source" says about what *might* happen or might have happened.
- News does not come from a single, unverified, and anonymous source.
- News is not slick video dramatically recreating an event.
- News is not B-roll video of something the producer thinks looks like a current event, especially if the video is not clearly marked as *not the same event.*
- News is not fifteen screaming 911 calls about an incident, interviews with everyone who's heard about it, or what a pseudo-celebrity thinks about it.
- News is never what anyone named Paltrow, West, Oz, Phil, Kardashian, DJ-anything, etc., says, unless it's about their industry or craft.
- News is not a press release from a company, especially

the owners of the media outlet presenting it.

Logical fallacies are the least of your worries in a world of speculation, promotion, advocacy, and fantasy.

John Jogerst
Colonel, USAF (retired)
Navarre, Florida

Essential Oils?

Regarding the article on essential oils that attempts to debunk their utility ("Essential Oils: One Weird Workshop," November/December 2018): I would not be as in a hurry to throw the essential oil baby out with the bath water of ineffective and inexperienced practitioners. Scents do matter, as all lovers and cooks know. There is plenty of evidence that these oils are chemically active agents with hormonal, antibacterial, antiviral, anti-inflammatory, and anti-nosioceptive potential effects when applied directly to living systems. The intuitive and experiential underpinnings of essential oil therapy is evolving into the science of pheromones.

The question aromatherapy poses is: Can essential oils be effective as transdermal agents or aerosolized particles, and if so, at what dose? The literature does support that these oils can be inhaled via the lung and absorbed through the skin. Not much literature shows crossing the blood-brain barrier. Keep in mind also that the nose allows the brain direct contact with the incoming air through the fenestration of the skull, therefore the blood-brain interface is not a prerequisite for their central nervous system effects. It is within this background one should view essential oils, their subtlety, and potential effective power.

George Bone, MD
I C Care
Largo, Maryland

Susan Gould replies:

Thank you, Dr. Bone, for pointing out that essential oils may turn out to have merit in some circumstances. There may well be antibiotic and other properties from essential oils. However, one cannot be certain about concentrations, dosages, or when they are even appropriate. I am unaware of any studies about potential side effects or the possibility of essential oils leading to more antibiotic resistance. Hopefully, there will be serious scientific research on essential oils and other forms of folk medicine. Until then, I prefer staying with treatments approved by the AMA.

Psychics and Crime

Your book review titled "When Psychics Come Under Control of Organized Crime" (November/December 2018) prompts this note:

In 2011, a letter arrived for my brother-in-law Harold from Maria Duval:

> Dear Harold,
> In a few days time, I'm going to consult the future for you, to discover the numbers that should scoop one of the biggest lottery prizes ... . I can help you to start a new and much more pleasant life. ... Your life hasn't always been very easy. You often feel that you are dogged by an abnormal amount of bad luck. In spite of everything you have endured you have always found the courage to carry on fighting ... but now you are definitely feeling discouraged, and visibly "at the end of your tether". And it seems that money is the biggest problem for you. You need some right now. Harold, now you know that you only need to take one simple step to be able to see the course of your life changing. Take it for yourself, for the people you love. Act this very minute, while there's still time, and before you forget.

After a long life of good luck, success and happiness, Harold didn't take up Ms. Duval's kind offer. Also, he'd been dead for seven years.

Hugh Young
Pukerua Bay, New Zealand

Suicide Numbers

I'm not sure whether the suggestion that "someone commits suicide terrorism every forty seconds" in Harriet Hall's review of James E. Alcock's book *Belief* is hers or his. In either case it's wrong, very wrong. It suggests a total of 700,000 suicide attacks per year.

In 2017, the number of terrorist incidents (suicide and others) worldwide recorded on the Global Terrorism Database was 10,900, resulting in 26,502 deaths. The Chicago Project on Security and Terrorism Suicide Attack Database recorded a total of 4,814 suicide attacks between 1983 and September 2015, leading to over 45,000 deaths.

The first sentence in the section headed Suicide Data on the World Health Organization website reads "Close to 800,000 people die due to suicide every year, which is one person every 40 seconds."

Geoffrey Taunton
Montmorillon, France

Harriet Hall responds:

The error was mine. What Alcock said referred to suicides, not suicidal terrorism. He said, "On average, more than a million people around the world take their own lives each year, one person every forty seconds. Suicide is the second-leading cause of death for young people between fifteen and twenty-four years of age, accounting for almost a quarter of all deaths." (He gives references for those facts). I apologize. Thank you for spotting the error and bringing it to our attention.

Author Apology for Error on Monty Hall Problem

Many readers of SI were rightfully skeptical of a numerical probability that I conveyed in my SI article "Grand Illusions and Existential Angst" (November/December 2018, p. 52). This caused me to immediately re-examine my methodology in determining this quantity.

I used a Python computer code to determine the statistical probabilities involved in the Monty Hall problem. This included the probability of getting the door with the new car when the participant always switched their door selection and when they used a coin to determine which door to choose. I reported that always switching gave the participant a two-thirds probability of selecting the door with the car and, when having a coin flip determine which door, I stated a probability of one-third.

I set about going through my computer code line-by-line examining its flow and became deeply distraught upon identifying a mistake. This mistake caused my output probability to be one-third when it should have outputted one-half probability of choosing the door with the new car when a coin flip determines whether to switch doors.

I take full responsibility for this mistake and sincerely apologize. This part of my work was insufficiently meticulous for the standards I long to uphold. In fact, it bolsters the quote presented earlier in the article that stated both layman and scientists are easily fooled and are particularly susceptible to self-deception. Nonetheless, if clemency can be granted, I do feel that its impact on the overall thesis of the article is minor.

Alan Scott
Department of Physics
University of Wisconsin
-Stout
Menomonie, Wisconsin

(Editor's note: We thank the many readers who wrote to us about this problem.)

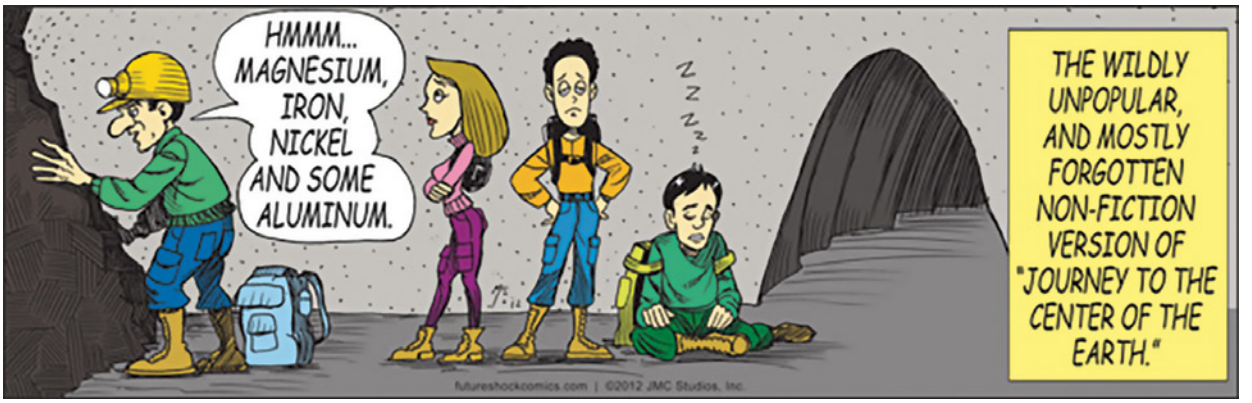
For the Record

In my letter ("Those Illusory Canals," November/December 2018), I erroneously cited philosopher David Lewis's 1986 book *On the Plurality of the Worlds*, rather than astronomer Camille Flammarion's 1862 work titled *La pluralité des mondes habités*. In it he outlines the likely habitability of other planets from an astronomical, physiological, and natural philosophy standpoint.

Klaus Brasch
Flagstaff, Arizona

Note 1 at the end of Jan Willem Nienhuys's News and Comment item about fringe-scientist Santilli's suit against Dutch skeptics (January/February 2018, page 6) was accidentally truncated. The final sentence should have read, "Santilli claims that he has measured a tiny redshift of spectral lines at the time of sunset and sunrise, something no serious solar astronomer has ever noticed."

Future Shock by Jim & Pat McGreal

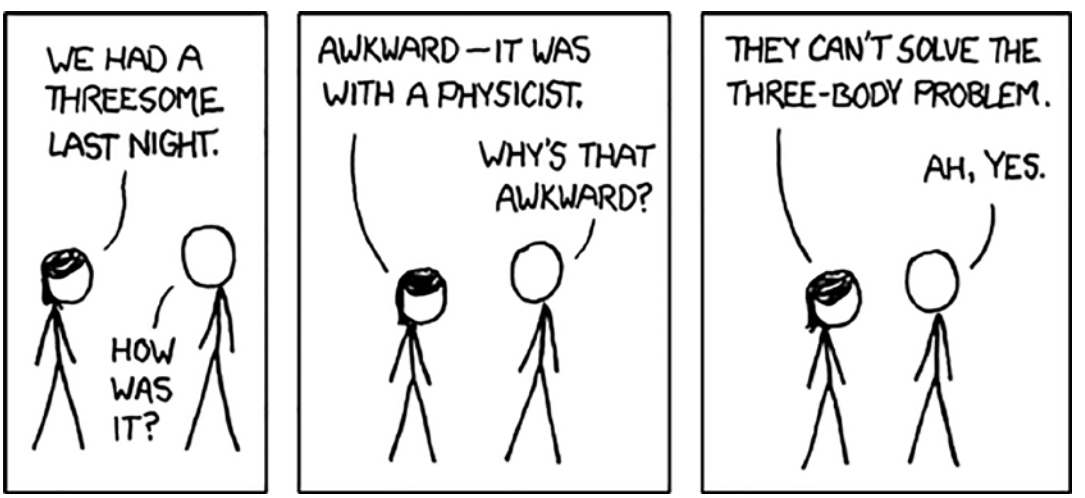

HMMM... MAGNESIUM, IRON, NICKEL AND SOME ALUMINUM.
ZZZzz
THE WILDLY UNPOPULAR, AND MOSTLY FORGOTTEN NON-FICTION VERSION OF "JOURNEY TO THE CENTER OF THE EARTH."
futureshockcomics.com | ©2012 JMC Studios, Inc.

Future Shock by Jim & Pat McGreal

TIME TRAVELERS FROM 1990 ARRIVE IN 2012.
THERE MUST HAVE BEEN SOME KIND OF ANTI-TECHNOLOGY REVOLUTION. LOOK, EVERYBODY'S THROWN AWAY THEIR TV SETS AND COMPUTER MONITORS!

futureshockcomics.com

XKCD: Threesome


WE HAD A THREESOME LAST NIGHT.
HOW WAS IT?
AWKWARD—IT WAS WITH A PHYSICIST.
WHY'S THAT AWKWARD?
THEY CAN'T SOLVE THE THREE-BODY PROBLEM.
AH, YES.

www.xkcd.com

Committee for Skeptical Inquiry

Scientific and Technical Consultants

Gary Bauslaugh,
writer and editor,
Victoria, B.C., Canada

Richard E. Berendzen,
astronomer, Washington, DC

Martin Bridgstock,
senior lecturer, School of Science,
Griffith Univ., Brisbane, Australia

Richard Busch,
magician/mentalist, Pittsburgh, PA

Shawn Carlson,
Society for Amateur Scientists,
East Greenwich, RI

Roger B. Culver,
prof. of astronomy, Colorado State Univ.

Felix Ares de Blas,
prof. of computer science,
Univ. of Basque, San Sebastian, Spain

Nahum J. Duker,
assistant prof. of pathology,
Temple Univ.

Taner Edis,
Division of Science/Physics
Truman State Univ.

Barbara Eisenstadt,
psychologist, educator, clinician,
East Greenbush, NY

William Evans,
prof. of journalism and
creative media, Univ. of Alabama

Bryan Farha,
prof. of behavioral studies in
education, Oklahoma City Univ.

John F. Fischer,
forensic analyst, Orlando, FL

Eileen Gambrill,
prof. of social welfare,
Univ. of California at Berkeley

Luis Alfonso Gámez,
science journalist, Bilbao, Spain

Sylvio Garattini,
director, Mario Negri Pharmacology
Institute, Milan, Italy

Susan Gerbic,
founder and leader of the Guerilla Skepticism on Wikipedia (GSoW) project

Laurie Godfrey,
anthropologist, Univ. of Massachusetts

Gerald Goldin,
mathematician, Rutgers Univ., NJ

Donald Goldsmith,
astronomer; president, Interstellar Media

Alan Hale,
astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Sharon Hill,
geologist, writer, researcher, creator and
editor of the *Doubful News* blog

Gabor Hrasko,
chairman of the European Council of Skeptical Organizations (ECSO), president
of Hungarian Skeptics

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

I.W. Kelly,
prof. of psychology, Univ. of Saskatchewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

William M. London,
California State Univ., Los Angeles

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

John R. Mashey,
computer scientist/executive (Bell
Labs, then Silicon Valley), analyst of
climate-change denial, contributor to
DeSmogBlog and Skeptical Science, Portola
Valley, CA

Thomas R. McDonough,
astrophysicist, Pasadena, CA

James E. McGaha,
astronomer, USAF pilot (ret.)

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Matthew C. Nisbet,
professor of communication studies, public
policy, and urban affairs at Northeastern
University

Julia Offe,
neurobiologist, science journalist, creator
of German Science Slam

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Tim Printy,
amateur astronomer, UFO skeptic, former
Navy nuclear reactor operator/division
chief, Manchester, NH

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist/archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin-Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

Affiliated Organizations | United States

ALABAMA
Alabama Skeptics, Alabama. Emory Kimbrough. Tel.: 205-759-2624. 3550 Watermelon Road, Apt. 28A, Northport, AL 35476

ARIZONA
Tucson Skeptics Inc. Tucson, AZ. James McGaha. Email:mcgaha@skepticus.com. 5100 N. Sabino Foothills Dr., Tucson, AZ 85715

Phoenix Area Skeptics Society (PASS) http://phoenixskeptics.org
Email: phoenixskeptics@gmail.com

Phoenix Skeptics, Phoenix, AZ. Michael Stackpole, P.O. Box 60333, Phoenix, AZ 85082

CALIFORNIA
Sacramento Organization for Rational Thinking (SORT) Sacramento, CA. Ray Spangenburg, co-founder. Tel.: 916-978-0321; Email: kitray2@comcast.net. PO Box 2215, Carmichael, CA 95609-2215 http://home.comcast.net/~kitray2/site/

Bay Area Skeptics (BAS) San Francisco—Bay Area. Eugenie C. Scott, President. 1218 Miluia St., Berkeley, CA 94709. Email: scott@ncse.com. www.BASkeptics.org

Independent Investigations Group (IIG), Center for Inquiry–Los Angeles, 4773 Hollywood Blvd, Los Angeles, CA 90027. Tel.: 323-666-9797. www.iighq.com

Sacramento Skeptics Society, Sacramento. Terry Sandbek, President. 4300 Auburn Blvd. Suite 206, Sacramento CA 95841. Tel.: 916 489-1774. Email: terry@sandbek.com

San Diego Association for Rational Inquiry (SDARI) President: Tom Pickett. Email: pickett.thomasj@gmail.com. Program/general information 619-421-5844. www.sdari.org. Postal address: PO Box 623, La Jolla, CA 92038-0623

CONNECTICUT
New England Skeptical Society (NESS) New England. Steven Novella M.D., President. Tel.: 203-281-6277; Email: board@theness.com. 64 Cobblestone Dr., Hamden, CT 06518 www.theness.com

D.C./MARYLAND
National Capital Area Skeptics NCAS, Maryland, D.C., Virginia. D.W. "Chip" Denman. Tel.: (240) 670-6227. Email: ncas@ncas.org. PO Box 8461, Silver Spring, MD 20907-8428 http://www.ncas.org

FLORIDA
Tampa Bay Skeptics (TBS) Tampa Bay, Florida. Rick O'Keefe, contact person. Tel.: 813-505-7013; Email: tbs@centerforinquiry.net. c/o O'Keefe, 4011 S. Manhattan Ave. #139, Tampa, FL 33611-1277. www.tampabayskeptics.org

ILLINOIS
Rational Examination Association of Lincoln Land (REALL) Illinois. Bob Ladendorf, Chairman. Tel.: 217-546-3475; Email: chairman@reall.org. PO Box 20302, Springfield, IL 62708 www.reall.org

Chicago Skeptics Jennifer Newport, contact person. Email: chicagoskeptics@gmail.com. www.chicagoskeptics.com

LOUISIANA
Baton Rouge Proponents of Rational Inquiry and Scientific Methods (BR-PRISM) Louisiana. Marge Schroth. Tel.: 225-766-4747. 425 Carriage Way, Baton Rouge, LA 70808

MICHIGAN
Great Lakes Skeptics (GLS) SE Michigan. Lorna J. Simmons, Contact person. Tel.: 734-525-5731; Email: Skeptic31@aol.com. 31710 Cowan Road, Apt. 103, Westland, MI 48185-2366

Tri-Cities Skeptics, Michigan. Dr. Gary Peterson. Tel.: 989-964-4491; e-mail: peterson@svsu.edu. www.tcskeptics.blogspot.com

MINNESOTA
St. Kloud Extraordinary Claim Psychic Teaching Investigating Community (SKEPTIC) St. Cloud, Minnesota. Jerry Mertens. Tel.: 320-255-2138; Email: gmertens@stcloudstate.edu. Jerry Mertens, Psychology Department, 720 4th Ave. S, St. Cloud State Univ., St. Cloud, MN 56301

MISSOURI
Skeptical Society of St. Louis (SSSL) St. Louis, Missouri. Michael Blanford, President. Email: info@skepticalstl.org. 2729 Ann Ave., St. Louis, MO 63104 www.skepticalstl.org

St. Joseph Skeptics
P.O. Box 8908
St. Joseph MO, 64508-8908

NEVADA
Reno Skeptical Society, Inc., Brad Lutts, President. Tel.: (775) 335-5505; Email: info@RenoSkeptics.org. 18124 Wedge Parkway #1052 Reno, Nevada 89511. www.RenoSkeptics.org

NEW MEXICO
New Mexicans for Science and Reason (NMSR) New Mexico. David E. Thomas, President. Tel.: 505-869-9250; Email: nmsrdave@swcp.com. 801 Fitch Ave., Socorro, NM 87801. www.nmsr.org

NEW YORK
New York City Skeptics Michael Feldman, president. PO Box 5122 New York, NY 10185. www.nycskeptics.org

Central New York Skeptics (CNY Skeptics) Syracuse. Lisa Goodlin, President. Tel: (315) 636-6533; Email: info@cnyskeptics.org, cnyskeptics.org PO Box 417, Fayettville, NY 13066

OHIO
Central Ohioans for Rational Inquiry (CORI) Central Ohio. Charlie Hazlett, President. Tel.: 614-878-2742; Email: charlie@hazlett.net. PO Box 282069, Columbus, OH 43228

Cleveland Skeptics Joshua Hunt, Co-Organizer, www.clevelandskeptics.org

South Shore Skeptics (SSS) Cleveland and counties. Jim Kutz. Tel.: 440 942-5543; Email: jimkutz@earthlink.net. PO Box 5083, Cleveland, OH 44101 www.southshoreskeptics.org

Association for Rational Thought (ART) Cincinnati. Roy Auerbach, president. Tel: (513)-731-2774, Email: raa@cinci.rr.com. PO Box 12896, Cincinnati, OH 45212. www.cincinnati skeptics.org

OREGON
Oregonians for Science and Reason (OSR) Oregon. Jeanine DeNoma, president. Tel.: (541) 745-5026; Email: wilkinsa@peak.org; 39105 Military Rd., Monmouth, OR 97361. www.04SR.org

PENNSYLVANIA
Philadelphia Association for Critical Thinking (PhACT), Bob Glickman President. 653 Garden Road Glenside PA 19038. 215-885-2089 E-mail: President@phact.org. Website: www.phact.org

TENNESSEE
Rationalists of East Tennessee, East Tennessee. Carl Ledenbecker. Tel.: (865)-982-8687; Email: Aletall@aol.com. 2123 Stonybrook Rd., Louisville, TN 37777

TEXAS
North Texas Skeptics NTS Dallas/Ft Worth area, John Blanton, Secretary. Tel.: (972)-306-3187; Email: skeptic@ntskeptics.org. PO Box 111794, Carrollton, TX 75011-1794. www.ntskeptics.org

VIRGINIA
The James Randi Educational Foundation. James Randi, Director. 2941 Fairview Park Drive, Suite 105 Falls Church, VA 22042
Email: jref@randi.org
Telephone: 571-318-6530

Science & Reason, Hampton Rds., Virginia. Lawrence Weinstein, Old Dominion Univ.-Physics Dept., Norfolk, VA 23529

WASHINGTON
Seattle Skeptics
www.seattleskeptics.com

The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst NY 14226-0703.
International affiliated organizations listed at www.csicop.org.

CENTERS FOR INQUIRY

www.centerforinquiry.net/about/branches

Transnational
3965 Rensch Road, Amherst, NY 14228
Tel.: (716) 636-4869

Austin
PO Box 300036, Austin, TX 78703
Tel.: (512) 454-0977

Chicago
chicago@centerforinquiry.net

Indianapolis
350 Canal Walk, Suite A, Indianapolis, IN 46202
Tel.: (317) 423-0710

Los Angeles
2535 W. Temple St., Los Angeles, CA 90026
Tel.: (323) 666-9797

Michigan
3777 44th Street SE, Grand Rapids, MI 49512 Tel.: (616) 698-2342

New York City
33-29 28th St. Astoria, NY 11106

San Francisco
email: sf@centerforinquiry.net

Tampa Bay
4011 S. Manhattan Ave. #139, Tampa, FL 33611-1277
Tel.: (813) 505-7013

Washington, DC
1012 14th Street., NW, Suite 205
Washington, DC 20005
tel.: (202) 733-5275

Argentina
Buenos Aires, Argentina
alejandroborgo@gmail.com
Facebook: CFI Argentina

Canada
55 Eglinton Ave. East, Suite 307
Toronto, Ontario, M4P 1G8, Canada

China
China Research Institute for Science Popularization, NO. 86, Xueyuan Nanlu Haidian Dist., Beijing, 100081 China
Tel.: +86-10-62170515

Egypt
44 Gol Gamal St., Agouza, Giza, Egypt

London
Conway Hall, 25 Red Lion Square,
London WC1R 4RL, England

Nepal
Humanist Association of Nepal,
PO Box 5284, Kathmandu Nepal
Tel.: +977-1-4413-345

New Zealand
email: bcooke@centerforinquiry.net

Nigeria
PO Box 25269, Mapo, Ibadan, Oyo State, Nigeria
Tel.: +234-2-2313699

Peru
Ex. Dir. Manuel Paz-y-Miño
Calle El Corregidor 318, Rimac, Lima 25-PERU
email: humanarazon_peru@yahoo.com

Poland
Lokal Biurowy No. 8, 8 Sapiezynska Sr.,
00-215, Warsaw, Poland

Romania
Fundatia Centrul pentru Constiinta Critica
Tel.: (40)-(0)744-67-67-94
email: CenterforInquiry.Romania@gmail.com

Senegal
PO Box 15376, Dakar – Fann, Senegal
Tel.: +221-501-13-00

cfi
CENTER FOR INQUIRY